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**GLOBAL SYSTEM FOR
MOBILE COMMUNICATIONS**

Digital cellular telecommunications system (Phase 2+);
GSM Public Land Mobile Network (PLMN)
access reference configuration
(GSM 04.02)

ETSI

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Foreword

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

This GTS provides a mechanism giving reliable transfer of signalling messages within the digital cellular telecommunications system (Phase 2/Phase 2+).

This GTS is a TC-SMG approved GSM technical specification version 5, which contains GSM Phase 2+ enhancements/features to the version 4 GSM technical specification. The ETS from which this Phase 2+ GTS has evolved is Phase 2 GSM 04.02 version 4.0.4.

GTS 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.

The contents of this GTS are subject to continuing work within TC-SMG and may change following formal TC-SMG approval. Should TC-SMG modify the contents of this GTS 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.

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-ETSs (Phase 1), or ETSs/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 GTSs.

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1   Scope

This Technical Specification describes the reference configuration for access to a GSM PLMN.

A user accesses a GSM PLMN via a number of interfaces, including the MS-BS interface. The purpose of this Technical Specification is to indicate the possible access arrangements that may be used in conjunction with the MS-BS interface.

1.1   Normative references

This ETS 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 ETS only when incorporated in it by 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 02.02 (ETS 300 501): "Digital cellular telecommunications system (Phase 2); Bearer Services (BS) supported by a GSM Public Land Mobile Network (PLMN)".

[3]   GSM 04.01 (ETS 300 550): "Digital cellular telecommunications system (Phase 2); Mobile Station - Base Station System (MS - BSS) interface General aspects and principles".

[4]   GSM 04.03 (ETS 300 552): "Digital cellular telecommunications system (Phase 2); Mobile Station - Base Station System (MS - BSS) interface Channel structures and access capabilities".

[5]   GSM 04.04 (ETS 300 553): "Digital cellular telecommunications system (Phase 2); layer 1 General requirements".

[6]   GSM 04.05 (ETS 300 554): "Digital cellular telecommunications system (Phase 2); Data Link (DL) layer General aspects".

[7]   GSM 04.06 (ETS 300 555): "Digital cellular telecommunications system (Phase 2); Mobile Station - Base Station System (MS - BSS) interface Data Link (DL) layer specification".

[8]   GSM 04.07 (ETS 300 556): "Digital cellular telecommunications system (Phase 2); Mobile radio interface signalling layer 3 General aspects".

[9]   GSM 04.08 (ETS 300 557): "Digital cellular telecommunications system (Phase 2); Mobile radio interface layer 3 specification".

[10]   GSM 04.10 (ETS 300 558): "Digital cellular telecommunications system (Phase 2); Mobile radio interface layer 3 Supplementary services specification General aspects".

[11]   GSM 04.11 (ETS 300 559): "Digital cellular telecommunications system (Phase 2); Point-to-Point (PP) Short Message Service (SMS) support on mobile radio interface".

[12]   GSM 04.12 (ETS 300 560): "Digital cellular telecommunications system (Phase 2); Short Message Service Cell Broadcast (SMSCB) support on the mobile radio interface".

[13]   GSM 04.13 (ETS 300 561): "Digital cellular telecommunications system (Phase 2); Performance requirements on mobile radio interface".

[14]   GSM 04.21 (ETS 300 562): "Digital cellular telecommunications system (Phase 2); Rate adaption on the Mobile Station - Base Station System (MS - BSS) interface".

[15]   GSM 04.22 (ETS 300 563): "Digital cellular telecommunications system (Phase 2); Radio Link Protocol (RLP) for data and telematic services on the Mobile Station - Base Station System (MS - BSS) interface and the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface".

[16]   GSM 04.80 (ETS 300 564): "Digital cellular telecommunications system (Phase 2); Mobile radio interface layer 3 supplementary services specification Formats and coding".

[17]   GSM 04.81 (ETS 300 565): "Digital cellular telecommunications system (Phase 2); Line identification supplementary services - Stage 3".

[18]   GSM 04.82 (ETS 300 566): "Digital cellular telecommunications system (Phase 2); Call Forwarding (CF) supplementary services - Stage 3".

[19]   GSM 04.83 (ETS 300 567): "Digital cellular telecommunications system (Phase 2); Call Waiting (CW) and Call Hold (HOLD) supplementary services - Stage 3".

[20]   GSM 04.84 (ETS 300 568): "Digital cellular telecommunications system (Phase 2); MultiParty (MPTY) supplementary services - Stage 3".

[21]   GSM 04.85 (ETS 300 569): "Digital cellular telecommunications system (Phase 2); Closed User Group (CUG) supplementary services - Stage 3".

[22]   GSM 04.86 (ETS 300 570): "Digital cellular telecommunications system (Phase 2); Advice of Charge (AoC) supplementary services - Stage 3".

[23]   GSM 04.88 (ETS 300 571): "Digital cellular telecommunications system (Phase 2); Call Barring (CB) supplementary services - Stage 3".

[24]   GSM 04.90 (ETS 300 572): "Digital cellular telecommunications system (Phase 2); Unstructured supplementary services operation - Stage 3".

[25]   GSM 05.01 (ETS 300 573): "Digital cellular telecommunications system (Phase 2); Physical layer on the radio path General description".

[26]   GSM 05.02 (ETS 300 574): "Digital cellular telecommunications system (Phase 2); Multiplexing and multiple access on the radio path".

[27]   GSM 05.03 (ETS 300 575): "Digital cellular telecommunications system (Phase 2); Channel coding".

[28]   GSM 05.04 (ETS 300 576): "Digital cellular telecommunications system (Phase 2); Modulation".

[29]   GSM 05.05 (ETS 300 577): "Digital cellular telecommunications system (Phase 2); Radio transmission and reception".

[30]   GSM 05.08 (ETS 300 578): "Digital cellular telecommunications system (Phase 2); Radio subsystem link control".

[31]   GSM 05.10 (ETS 300 579): "Digital cellular telecommunications system (Phase 2); Radio subsystem synchronisation".

[32]   GSM 05.90 (ETR 108): "Digital cellular telecommunications system (Phase 2); GSM Electro Magnetic Compatibility (EMC) considerations".

[33]   GSM 07.01 (ETS 300 582): "Digital cellular telecommunications system (Phase 2); General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".

[34]   GSM 07.02 (ETS 300 583): "Digital cellular telecommunications system (Phase 2); Terminal Adaptation Functions (TAF) for services using asynchronous bearer capabilities".

[35]   GSM 07.03 (ETS 300 584): "Digital cellular telecommunications system (Phase 2); Terminal Adaptation Functions (TAF) for services using synchronous bearer capabilities".

[36]   CCITT Series V Recommendations: "Data communication over the Telephone network".

[37]   CCITT Series X Recommendations: "Data communication networks".

[38]   CCITT Recommendation I.420: "Basic user-network interface".

1.2   Abbreviations

Abbreviations used in this specification are listed in GSM 01.04

2   General definitions

The following definitions 2.1-2.3 are based on those used for ISDN.

2.1   Reference Configurations

Reference Configurations are conceptual configurations useful in identifying access arrangements to a network. Two concepts are used in defining reference configurations:

reference points and functional groups.

2.2   Functional Groups

Functional Groups are sets of functions which may be needed in network access arrangements. In a particular access arrangement, specific functions in a functional group may or may not be present. Note that specific functions in a functional group may be performed in one or more pieces of equipment.

2.3   Reference Points

Reference Points are the conceptual points dividing functional groups. In a specific access arrangement, a reference point may correspond to a physical interface between pieces of equipment, or there may not be any physical interface corresponding to the reference point.

The following definition is used in this Technical Specification:

2.4   GSM Interface Points

GSM Interface Points are reference points within a GSM PLMN at which a GSM specified interface is always identified.

3 GSM Reference Configuration

The reference configuration for GSM PLMN access interfaces is shown in figure 1.

```
        <─────────Mobile Station (MS)────────>│
                          ┌─────────┐    │    ┌─────────┐
                          │   MT0   ├────────┤ BS/MSC  │
                          └─────────┘    │    └─────────┘
              ┌───────┐   ┌─────────┐    │    ┌─────────┐
              │  TE1  ├───┤   MT1   ├────────┤ BS/MSC  │
              └───────┘ │ └─────────┘    │    └─────────┘
    ┌───────┐ ┌───────┐ │ ┌─────────┐    │    ┌─────────┐
    │  TE2  ├─┤  TA   ├───┤   MT1   ├────────┤ BS/MSC  │
    └───────┘ └───────┘ │ └─────────┘    │    └─────────┘
    ┌───────┐           │S┌─────────┐    │    ┌─────────┐
    │  TE2  ├────────────┤│   MT2   ├────────┤ BS/MSC  │
    └───────┘           │ └─────────┘    │    └─────────┘
                        │                │
                        │                │
                        R                Um
```
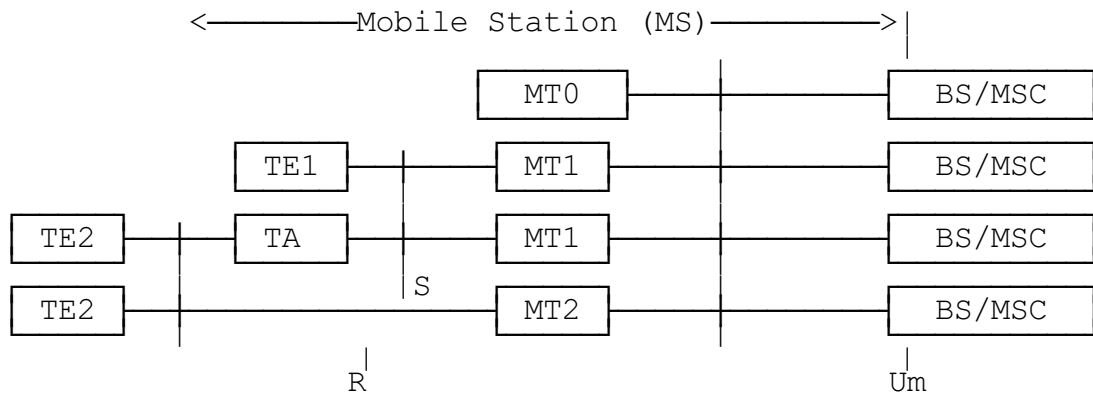
Figure 1: GSM PLMN Access Reference Configuration

The terminal equipment functional groups TE1, TE2 and TA are conceptually the same functional groups as those in the ISDN. The two new functional groups are:

3.1 Mobile Termination (MT)

which performs the following functions:

- radio transmission termination;

- radio transmission channel management;

- terminal capabilities, including presentation of a man-machine interface to a user;

- speech encoding/decoding;

- error protection for all information sent across the radio path. This includes FEC (forward error correction) and, for signalling and user data (except for transparent data services), ARQ (automatic request forretransmission);

- flow control of signalling and mapping of user signalling to/from PLMN access signalling;

- flow control of user data (except for transparent data services) and mapping of flow control for asynchronous transparent data services;

- rate adaptation of user data between the radio channel rate and user rates;

- multiple terminal support;

- mobility management.

There are three types of MT:

- MT0 includes functions belonging to the functional group MT, with support of no terminal interfaces.

- MT1 includes functions belonging to the functional group MT, and with an interface that complies with the GSM recommmended subset of the ISDN user-network interface specifications.

- MT2 includes functions belonging to the functional group MT, and with an interface that complies with the GSM 07.0x series Terminal Adaptation Function specifications. Accordingly, the interchange circuit mapping at the MT2 to TE interface shall comply with the CCITT V.24 or X.21 recmmendations; while the physical implementation shall conform either to the CCITT V.28, or V.11, or to the IrDA IrPHY, or to the PCMCIA 2.1, or to the PC-Card 3.0 electrical specification, or to later revisions.

The MT plus any TE/(TE + TA) constitutes the Mobile Station, MS.

3.2 Base Station + MSC (BS/MSC)

which include the following functions:

- radio transmission termination;

- speech transcoding;

- radio transmission channel management;

- error protection for all information sent across the radio path. This includes FEC (forward error correction) and for signalling and user data (except for transparent data services), ARQ (automatic request for retransmission);

- link layer functions for signalling across the radio path;

- MS-BS circuit establishment and release functions;

- handover functions;

- rate adaptation of user data.

4   Physical Realisation

In a GSM PLMN, the reference point Um is a GSM interface point, i.e. it is always implemented as a physical interface (according to GSM Technical Specifications in the 04 and 05 series). The reference points S and R may be optionally implemented as physical interfaces. The implementation of interfaces at these reference points is according to Technical Specifications GSM 07.01, 07.02 and 07.03.

Figure 2 gives examples of configurations illustrating combinations of physical interfaces at reference points R and S. The examples shown are not exhaustive, but only serve to illustrate possible implementations of the respective functional blocks.

Example (a) of figure 2 illustrates a fully integrated MS including data terminal functions within the mobile station equipment.

Example (b) of figure 2 illustrates the connection of a TE1 in accordance with Technical Specifications GSM 07.02/07.03 (and CCITT Recommendation I.420). In this example the speech service is offered via the TE1.

Example (c) of figure 2 illustrates the connection of a TE2 by a CCITT X or V series interface according to Technical Specifications GSM 07.02 and 07.03.

Example (d) of figure 2 illustrates the connection of a MT2 PCMCIA card to a TE2 by a PCMCIA 2.1 interface according to the Technical Specifications GSM 07.02 and 07.03.

Example (e) of figure 2 illustrates the connection of a TE2 by means of an ISDN TA to the MT equipment.

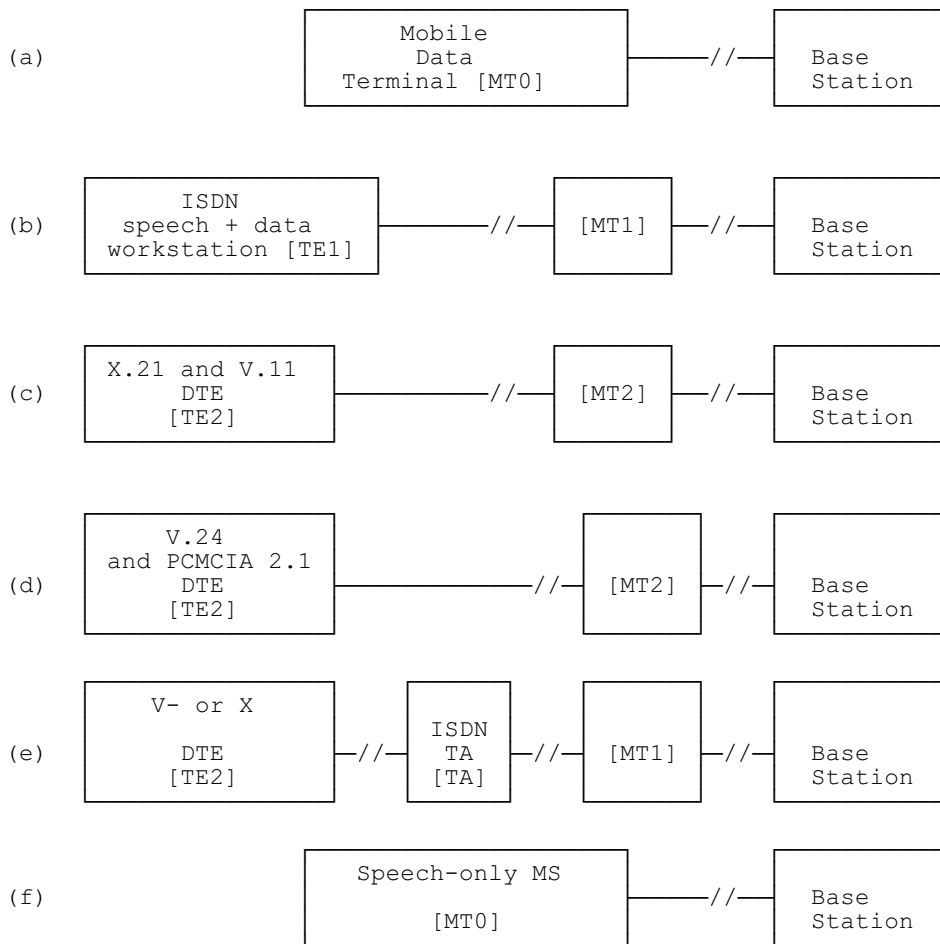Example (f) of figure 2 illustrates the connection of a speech only MS.

```
(a)                ┌──────────────────┐              ┌──────────┐
                   │     Mobile       │              │  Base    │
                   │      Data        │───//─────────│ Station  │
                   │ Terminal [MT0]   │              │          │
                   └──────────────────┘              └──────────┘


     ┌──────────────────┐           ┌───────┐          ┌──────────┐
     │      ISDN        │           │       │          │  Base    │
(b)  │  speech + data   │───//──────│ [MT1] │──//──────│ Station  │
     │ workstation [TE1]│           │       │          │          │
     └──────────────────┘           └───────┘          └──────────┘


     ┌──────────────────┐           ┌───────┐          ┌──────────┐
     │  X.21 and V.11   │           │       │          │  Base    │
(c)  │      DTE         │───//──────│ [MT2] │──//──────│ Station  │
     │     [TE2]        │           │       │          │          │
     └──────────────────┘           └───────┘          └──────────┘


     ┌──────────────────┐        ┌───────┐             ┌──────────┐
     │     V.24         │        │       │             │  Base    │
(d)  │ and PCMCIA 2.1   │───//───│ [MT2] │──//─────────│ Station  │
     │      DTE         │        │       │             │          │
     │     [TE2]        │        └───────┘             └──────────┘
     └──────────────────┘


     ┌──────────────────┐   ┌───────┐   ┌───────┐      ┌──────────┐
     │   V- or X        │   │ ISDN  │   │       │      │  Base    │
(e)  │      DTE         │──//─│  TA  │──//──│ [MT1] │──//──│ Station  │
     │     [TE2]        │   │ [TA]  │   │       │      │          │
     └──────────────────┘   └───────┘   └───────┘      └──────────┘


                   ┌──────────────────┐              ┌──────────┐
                   │  Speech-only MS  │              │  Base    │
(f)                │                  │───//─────────│ Station  │
                   │      [MT0]       │              │          │
                   └──────────────────┘              └──────────┘
```

Figure 2: Examples of physical implementations

History

Document history	
April 1996	Creation of Version 5.0.0 + CR 04.02-A002 r1
May 1996	Publication of Version 5.0.0