ETSI TR 149 001 V4.0.2 (2005-01)

Technical Report

**Digital cellular telecommunications system (Phase 2+);
General network interworking scenarios
(3GPP TR 49.001 version 4.0.2 Release 4)**

Reference
RTR/TSGN-0449001v402

Keywords
GSM

ETSI

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Sous-Préfecture de Grasse (06) N° 7803/88

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Foreword

This Technical Report (TR) has been produced by ETSI 3rd Generation Partnership Project (3GPP).

The present document may refer to technical specifications or reports using their 3GPP identities, UMTS identities or GSM identities. These should be interpreted as being references to the corresponding ETSI deliverables.

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Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

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

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x the first digit:

1 presented to TSG for information;

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y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document serves as an introduction to the GSM 09.xx-series.

In clause 4, the technical requirements for Public Land Mobile Network (PLMN) interworking are introduced, and in clause 5 there is a summary of the contents of the GSM 09.xx-series.

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]   3GPP TS 21.905: " Vocabulary for 3GPP Specifications ".

[2]   3GPP TS 22.001: "Principles of telecommunications services supported by a GSM Public Land Mobile Network (PLMN)".

[3]   3GPP TS 22.004: "General on supplementary services".

[4]   3GPP TS 23.011: "Technical realization of supplementary services".

[5]   3GPP TS 24.008: "Mobile radio interface layer 3 specification".

[6]   3GPP TS 48.008: "Mobile Switching Centre - Base Station System (MSC - BSS) interface; Layer 3 specification".

[7]   3GPP TS 29.002: "Mobile Application Part (MAP) specification".

[8]   GSM 09.03: "Signalling requirements on interworking between the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN) and the Public Land Mobile Network (PLMN)".

[9]   3GPP TS 29.004: "Interworking between the Public Land Mobile Network (PLMN) and the Circuit Switched Public Data Network (CSPDN)".

[10]   3GPP TS 29.005: "Interworking between the Public Land Mobile Network (PLMN) and the Packet Switched Public Data Network (PSPDN) for Packet Assembly/Disassembly facility (PAD) access".

[11]   3GPP TS 29.006: "Interworking between a Public Land Mobile Network (PLMN) and a Packet Switched Public Data Network/Integrated Services Digital Network (PSPDN/ISDN) for the support of packet switched data transmission services".

[12]   3GPP TS 29.007: "General requirements on interworking between the Public Land Mobile Network (PLMN) and the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN)".

[13]   3GPP TS 49.008: "Application of the Base Station System Application Part (BSSAP) on the E-interface".

[14]   3GPP TS 29.010: "Information element mapping between Mobile Station - Base Station System and BSS - Mobile-services Switching Centre (MS - BSS - MSC); Signalling procedures and the Mobile Application Part (MAP)".

[15]   3GPP TS 29.011: "Signalling interworking for supplementary services".

[16]   GSM 09.90: "Interworking between Phase 1 infrastructure and Phase 2+ Mobile Stations (MS)".

[17]   CCITT Recommendation I.130 (1988): "Methods for the characterization of telecommunication service supported by an ISDN and network capabilities of an ISDN".

[18]   CCITT Recommendation I.130 (1988): "Methods for the characterization of telecommunication service supported by an ISDN and network capabilities of an ISDN".

[19]   CCITT Recommendation I.200 (series): "Guidance to the I.200-series of Recommendations".

[20]   CCITT Recommendation I.500 (series): "General Structure of the ISDN interworking Recommendations".

3   Abbreviations

In addition to those below, abbreviations used in the present document are listed in 3GPP TS 21.905.

BSS	Base Station System
CSPDN	Circuit Switched Public Data Network
EIR	Equipment Identity Register
GSM	Global System for Mobile communications
HLR	Home Location Register
ISDN	Integrated Services Digital Network
IWF	Interworking Function
ISUP	ISDN User Part
MAP	Mobile Application Part
MS	Mobile Station
MSC	Mobile-services Switching Centre
MTP	Message Transfer Part
PAD	Packet Assembly/Disassembly facility
PLMN	Public Land Mobile Network
PSPDN	Packet Switched Public Data Network
PSTN	Public Switched Telephone Network
SCCP	Signalling Connection Control Part
SS7	Signalling System No 7
TC	Transaction Capabilities
TUP	Telephone User Part
VLR	Visitor Location Register

4   Interworking requirements

4.1   Definitions of interworking

Within the scope of CCITT I.500-series of recommendations the term interworking is used to express interactions between networks, between end systems, or between parts thereof, with the aim of providing an end-to-end communication. The interactions required rely on functions and on the means to select these functions which include the conversion of physical and electrical states and the mapping of protocols. These functions are referred to as Interworking Functions (IWFs). An IWF may be implemented in the PLMN, Integrated Services Digital Network (ISDN), in the other types of network, at the user's premises, through a third-party service provider, or in some combination of these.

The IWFs needed are a result of service requirements for interworking, contained in the GSM 02.xx-series and in the CCITT I.200-series of recommendations.

4.2 Interworking between networks

Network interworking is required whenever a PLMN and a non-PLMN together are involved to provide an end-to-end connection and may be required in instance of a PLMN to PLMN connection (3GPP TS 29.007). Although the GSM PLMN is not an integrated part of the ISDN network it is the intention to provide ISDN similar services to its subscribers, as defined in 3GPP TS 22.001. Those services imply interworking requirements to following networks:

- Between GSM PLMN and Public Switched Telephone Network (PSTN/ISDN);

- Between GSM PLMN and Circuit Switched Public Data Network (CSPDN);

- Between GSM PLMN and Packet Switched Public Data Network (PSPDN);

- Between GSM PLMNs.

4.2.1 Signalling requirements for Call Control

For network interworking, signalling requirements have to be defined. Existing call control signalling procedures (e.g. Signalling System No 7 (SS7), ISDN User Part (ISUP), Telephone User Part (TUP) when interworking with ISDN) will be used between the PLMN and other types of network.

4.2.2 Inter PLMN signalling requirements

For the support of services to mobile stations roaming between different PLMNs it is required to provide the means for the conveyance of Mobile Application Part (MAP) messages (e.g. the support of SS7 Message Transfer Part (MTP), Signalling Connection Control Part (SCCP) and Transaction Capabilities (TC)).

4.3 Service interworking

Service interworking is required when the Teleservices at the calling and called terminals are different. No service interworking has been identified as a requirement of the GSM system for PSTN/ISDN network based services (GSM 02.xx-series).

4.4 Supplementary service interworking

The supplementary services are described in 3GPP TS 22.004 and in GSM 02.8x and 02.9x-series.

The way of providing supplementary service interworking between PLMNs and other CEPT networks is treated in 3GPP TS 23.011 and in GSM 03.8x and 03.9x-series, where each supplementary service IWF is described.

5 Introduction to GSM 09.xx-series

5.1 3GPP TS 29.002: Mobile Application Part specification

In 3GPP TS 29.002 the configuration of the GSM PLMN is treated, defining the entities of the GSM system, and the interconnection between PLMNs is treated. The entities of the PLMN are listed below:

- Home Location Register (HLR);

- Visitor Location Register (VLR);

- Mobile-services Switching Centre (MSC);

- Base Station System (BSS);

- Gateway MSC;

- Equipment Identity Register (EIR).

3GPP TS 29.002 describes the requirements for the signalling system and the procedures needed at the application level in order to fulfil these signalling needs.

5.2 GSM 09.03: Signalling requirements on interworking between the ISDN or PSTN and the PLMN

The signalling aspects of interworking between ISDN/PSTN and GSM PLMN are treated in GSM 09.03.

The general signalling requirements are split into requirements for the mobile network and requirements for the fixed network.

Interworking with PSTN for call set-up is treated, i.e. interworking with Telephone User Part (TUP) of SS7.

5.3 3GPP TS 29.004: Interworking between the PLMN and the CSPDN

The IWFs are identified and the requirements to support interworking between a GSM PLMN and a CSPDN are treated.

3GPP TS 29.004 covers two methods of interworking:

- PLMN to CSPDN direct;

- PLMN to CSPDN via ISDN.

5.4 3GPP TS 29.005: Interworking between the PLMN and the PSPDN for Packet Assembly/Disassembly (PAD) access

The IWFs are identified and the requirements to support interworking between GSM PLMN and PSTN for PAD access are treated.

PAD access is divided into Basic PAD access and Dedicated PAD access.

As regards Basic PAD access two types of network configuration (related to the location of the user) are defined, Home PAD access and Visited PAD access.

Dedicated PAD access is defined as shortest possible connection to a PAD from a PLMN. Dedicated PAD access treats two types of location of the PAD:

- PAD external to the PLMN;

- PAD internal to the PLMN.

A common set of profiles for the Dedicated PAD access is listed in annexes of 3GPP TS 29.005.

5.5 3GPP TS 29.006: Interworking between a PLMN and a PSPDN/ISDN for the support of Packet Switched Data Transmission services

3GPP TS 29.006 identifies the interworking functions and requirements in the interworking between a GSM PLMN and a PSPDN/ISDN for the support of Packet Switched data transmission (bearer) services.

Two types of services can be supported by a GSM PLMN:

- basic packet mode services;

- dedicated packet mode services.

5.6 3GPP TS 29.007: General requirements on interworking between the PLMN and the ISDN or PSTN

3GPP TS 29.007 deals with the requirements to support interworking between GSM PLMN and PSTN and between GSM PLMN and ISDN, i.e. identifying the necessary IWFs.

The interworking is split into:

- interworking with PSTN for speech calls;

- interworking with PSTN for data calls;

- interworking with PSTN for dual series calls;

- interworking with ISDN for speech calls;

- interworking with ISDN for data calls;

- interworking with ISDN for dual series calls.

5.7 GSM 09.09: Detailed signalling interworking within the PLMN and with the PSTN/ISDN

In GSM 09.09 the signalling interworking between messages defined in 3GPP TS 24.008, 08.08 and 09.02 is treated. Interworking with the fixed network is described using TUP or ISUP of SS7. In the MSC the signalling messages of the mentioned functions are handled:

- Call establishment;

- Call release;

- Location registration;

- Handover;

- Authentication.

Diagrams show the layer 3 messages between MSC-MS, MSC-BSS, MSC-fixed network, and MAP messages.

5.8 3GPP TS 29.010: Information element mapping between MS-BSS/BSS-MSC signalling procedures and the Mobile Application Part

3GPP TS 29.010 gives guidance to information element mapping between information elements of layer 3 messages sent on MS-BSS interface and information elements of MAP messages and treats additional interworking in the case that the MSC also processes the information.

The signalling mapping cases are divided into transparent and non transparent operations The format of the mapping and the illustration of mapping principles in MSC is shown in the subsection dealing with interworking in the MSC.

5.9 3GPP TS 29.011: Signalling interworking for supplementary services

3GPP TS 29.011 is providing a detailed specification for interworking between the A-interface protocol and the Mobile Application Part for handling of supplementary services.

Call related supplementary services interworking and call independent supplementary services interworking are treated separately.

5.10 GSM 09.90: Interworking between phase 1 infrastructure and phase 2 mobile stations

GSM 09.90 clarifies how interworking can be obtained between phase 2 mobile stations and phase 1 infrastructure. The objective is to obtain this without changing the consolidated set of phase 1 specifications. GSM 09.90 specifies the necessary amendments to the phase 1 infrastructure so that an acceptable service is offered to mobile stations of phase 2, guaranteeing that a phase 2 mobile station obtains all phase 1 services.

The necessary changes are outlined as well as the necessary controls and clarifications with regard to phase 1 implementation, which should be performed to the different interfaces in phase 1 infrastructure before phase 2 mobiles are offered service.

Annex A (informative): Change history

<table>
<tr><th colspan="8">Change history</th></tr>
<tr><th>Date</th><th>TSG #</th><th>TSG Doc.</th><th>CR</th><th>Rev</th><th>Subject/Comment</th><th>Old</th><th>New</th></tr>
<tr><td>Jun 2000</td><td></td><td></td><td></td><td></td><td>Publication of 09.01</td><td></td><td>8.0.0</td></tr>
<tr><td>Mar 2001</td><td>CN#11</td><td></td><td></td><td></td><td>Rel-4 (49.001) Approved at CN#11</td><td>8.0.0</td><td>4.0.0</td></tr>
<tr><td>Jun 2002</td><td>CN#16</td><td></td><td></td><td></td><td>References updated</td><td>4.0.0</td><td>4.0.1</td></tr>
<tr><td>Jan 2005</td><td></td><td></td><td></td><td></td><td>Cover page: changed document type from TS to TR.</td><td>4.0.1</td><td>4.0.2</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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History

Document history		
V4.0.0	June 2001	Publication (Withdrawn)
V4.0.1	June 2002	Publication (Withdrawn)
V4.0.2	January 2005	Publication