

**3rd Generation Partnership Project;
Technical Specification Group Services and Systems Aspects;
Network architecture
(Release 1999)**



The present document has been developed within the 3rd Generation Partnership Project (3GPP™) and may be further elaborated for the purposes of 3GPP. The present document has not been subject to any approval process by the 3GPP Organisational Partners and shall not be implemented. This Specification is provided for future development work within 3GPP only. The Organisational Partners accept no liability for any use of this Specification. Specifications and reports for implementation of the 3GPP™ system should be obtained via the 3GPP Organisational Partners' Publications Offices.

Keywords

Digital cellular telecommunications system,
Global System for Mobile communications (GSM)
Universal Mobile Telecommunication System
(UMTS)

3GPP

Postal address

F-06921 Sophia Antipolis Cedex - FRANCE

Office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

<http://www.3gpp.org>

Copyright Notification

No part may be reproduced except as authorized by written permission.
The copyright and the foregoing restriction extend to reproduction in all media.

© 2000, 3GPP Organizational Partners (ARIB, CWTS, ETSI, T1, TTA, TTC).
All rights reserved.

Contents

Foreword	6
Introduction	6
1 Scope	7
2 References	7
3 Definitions and abbreviations	9
3.1 Public Land Mobile Network (PLMN)	9
3.2 Core Network (CN) and Access Network (AN).....	9
3.3 Circuit Switched (CS) and Packet Switched (PS) Domains	9
3.3.1 CS Domain	10
3.3.2 PS Domain	10
3.4 Location register	10
3.5 Cell.....	10
3.6 Base Station Controller (BSC) area	11
3.7 Radio Network Controller (RNC) area	11
3.8 Location Area (LA).....	11
3.9 Routing Area (RA).....	11
3.10 MSC area	11
3.11 VLR area.....	11
3.12 SGSN area	11
3.13 Zones for Regional Subscription.....	11
3.14 Service area.....	12
3.15 Group call area.....	12
4 The basic entities of the mobile system	12
4.1 The Core Network (CN) entities	12
4.1.1 Entities common to the PS and CS domains.....	12
4.1.1.1 The Home Location Register (HLR)	12
4.1.1.2 The Visitor Location Register (VLR).....	13
4.1.1.3 The Authentication Centre (AuC).....	14
4.1.1.4 The Equipment Identity Register (EIR).....	14
4.1.1.5 SMS Gateway MSC (SMS-GMSC).....	14
4.1.1.6 SMS Interworking MSC	14
4.1.2 Entities of the CS domain.....	14
4.1.2.1 The Mobile-services Switching Centre (MSC).....	14
4.1.2.2 The Gateway MSC (GMSC).....	15
4.1.2.3 The Interworking Function (IWF)	15
4.1.3 Entities of the PS domain	15
4.1.3.1 Serving GPRS Support Node (SGSN).....	15
4.1.3.2 Gateway GPRS Support Node (GGSN)	16
4.1.3.3 Border Gateway (BG).....	16
4.2 The Access Network (AN) entities	16
4.2.1 The Base Station System (BSS)	16
4.2.1.1 Base Station Controller (BSC).....	16
4.2.1.2 Base Transceiver Station (BTS)	17
4.2.2 The Radio Network System (RNS)	17
4.2.2.1 Radio Network Controller (RNC).....	17
4.2.2.2 Node B.....	17
4.3 The Mobile Station (MS).....	17
4a The specific entities of the mobile system.....	17
4a.1 The Group Call Register (GCR) entity	17
4a.2 The Shared InterWorking Function (SIWF) entity	18
4a.3 The Location Services (LCS) entities	18
4a.3.1 Serving Mobile Location Center (SMLC).....	18
4a.3.2 Gateway Mobile Location Center (GMLC)	19

4a.3.3	Location Measurement Unit (LMU).....	19
4a.4	CAMEL entities	20
4a.4.1	GSM Service Control Function (gsmSCF).....	20
4a.4.2	GSM Service Switching Function (gsmSSF)	20
4a.4.3	GSM Specialised Resource Function (gsmSRF).....	20
4a.5	CBS-specific entities.....	20
4a.5.1	Cell Broadcast Center (CBC).....	20
4a.6	Number Portability Specific entities	20
4a.6.1	IN-based solution: Number Portability Database (NPDB).....	20
4a.6.2	Signalling Relay-based solution: Mobile Number Portability/Signalling Relay function (MNP-SRF)	21
5	Configuration of a Public Land Mobile Network	21
5.1	Basic configuration	21
5.2	Configuration of LCS entities	22
5.2.1	Configuration of LCS entities in GSM	22
5.2.2	Configuration of LCS entities in UMTS	23
5.3	Configuration of CAMEL entities.....	24
5.4	Configuration of CBS entities.....	25
6	PLMN basic interfaces.....	25
6.1	Interfaces between Mobile Station and the Fixed Infrastructure.....	25
6.1.1	Interface between Mobile Station and Base Station System (Um-interface).....	25
6.1.2	Interface between Mobile Station and Radio Netwok System (Uu-interface).....	25
6.2	Interface between the Core Network and the Access Network	26
6.2.1	Interfaces between the CS domain and the Access Network	26
6.2.1.1	Interface between the MSC and Base Station System (A-interface).....	26
6.2.1.2	Interface between the MSC and RNS (Iu_CS interface).....	26
6.2.2	Interfaces between the PS domain and the Access Network	26
6.2.2.1	Interface between SGSN and BSS (Gb-interface)	26
6.2.2.2	Interface between SGSN and RNS (Iu_PS-interface).....	26
6.3	Interfaces internal to the Access Network.....	26
6.3.1	Interface between BSC and BTS (Abis-interface).....	26
6.3.2	Interface between RNC and Node B (Iubis-interface).....	27
6.3.3	Interface between two RNCs (Iur-interface)	27
6.4	Interfaces internal to the Core Network	27
6.4.1	Interfaces internal to the CS domain	27
6.4.1.1	Interface between the MSC and its associated VLR (B-interface).....	27
6.4.1.2	Interface between the HLR and the MSC (C-interface).....	27
6.4.1.3	Interface between the HLR and the VLR (D-interface).....	27
6.4.1.4	Interface between MSCs (E-interface).....	28
6.4.1.5	Interface between MSC and EIR (F-interface)	28
6.4.1.6	Interface between VLRs (G-interface).....	28
6.4.2	Interfaces internal to the PS domain.....	28
6.4.2.1	Interface between SGSN and HLR (Gr-interface)	28
6.4.2.2	Interface between SGSN and GGSN (Gn- and Gp-interface).....	28
6.4.2.3	Signalling Path between GGSN and HLR (Gc-interface)	28
6.4.2.4	Interface between SGSN and EIR (Gf-interface).....	29
6.4.3	Interfaces used by CS and PS domains	29
6.4.3.1	Interface between MSC/VLR and SGSN (Gs-interface)	29
6.4.3.2	Interface between HLR and AuC (H-Interface).....	29
6a	PLMN specific interfaces	29
6a.1	GCR-specific interface.....	29
6a.1.1	Interface between the MSC and its associated GCR (I-interface)	29
6a.2	SIWFS-specific interface	29
6a.2.1	Interface between MSC and SIWFS (K-Interface).....	29
6a.3	LCS-specific interfaces	30
6a.3.1	Interface between MSC and GMLC (Lg-interface).....	30
6a.3.2	Interface between MSC and SMLC (Ls-interface)	30
6a.3.4	Interface between GMLC and HLR (Lh-interface)	30
6a.3.5	Interface between SMLC and MSC/VLR (Ls-interface)	30

6a.3.4	Interface between BSC and SMLC (Lb-interface)	30
6a.3.6	Interface between Peer SMLCs (Lp-interface).....	30
6a.3.7	Interface between BTS and LMU (Um-interface).....	30
6a.4	CAMEL-specific interfaces	31
6a.4.1	GMSC - gsmSSF interface.....	31
6a.4.2	gsmSSF - gsmSCF interface	31
6a.4.3	MSC - gsmSSF interface	31
6a.4.4	gsmSCF - HLR interface	31
6a.4.5	gsmSCF - gsmSRF interface.....	31
6a.4.6	MSC - gsmSCF interface	31
6a.5	CBS-specific interfaces.....	31
6a.5.1	Interface between the CBC and RNS (Iu_BC Interface).....	31
6a.6	Number portability specific interfaces	32
6a.6.1	IN-based solution	32
6a.6.1.1	NPDB to MSC interface	32
6a.6.2	Signalling Relay-based solution	32
6a.6.2.1	GMSC to MNP-SRF interface.....	32
6a.6.2.2	MNP-SRF to HLR interface	32
7	Interface to external networks.....	32
7.1	Interface between the fixed networks and the MSC.....	32
7.2	Interface between GGSN and external data networks (Gi-interface)	32
7.3	Interface between GMLC and external LCS Client (Le-interface)	32

Annex A (informative): Description for GLR-related entities and interfaces.....33

A.1	Normative references	33
A.2	Definitions related to Gateway Location Register (GLR)	33
A.2.1	Gateway Location Register (GLR)	33
A.2.2	Intermediate Mobile-services Switching Centre (IM-MSC)	33
A.2.3	Intermediate GPRS Serving Node (IM-GSN).....	33
A.3	The entities of the mobile system	33
A.3.1	Gateway Location Register (GLR)	33
A.3.2	Intermediate Mobile-services Switching Centre (IM-MSC)	34
A.3.3	Intermediate GPRS Serving Node (IM-GSN).....	34
A.4	Configuration of a Public Land Mobile Network	34
A.4.1	Basic configuration with GLR introduction	34
A.5	PLMN interfaces	35
A.5.1	Interface between the HLR and the GLR (GLa-interface)	35
A.5.2	Interface between the VLR and the GLR (GLb-interface).....	35
A.5.3	Interface between the SGSN and the GLR (GLc-interface).....	35
A.5.4	Interface between the GLR and the IM_MSC (GLd-interface).....	35
A.5.5	Interface between the GLR and the IM_GSN (GLE-interface)	35
A.5.6	Interface between the SMS-GMSC and the GLR (GLf-interface)	36
A.5.7	Interface between the SMS-GMSC and the IM_MSC (GLg-interface)	36
A.5.8	Interface between the MSC and the IM_MSC (GLh-interface)	36
A.5.9	Interface between the GMLC and the IM_MSC (GLi-interface)	36
A.5.10	Interface between the GGSN and the IM_GSN (GLj-interface)	36
A.5.11	Interface between the SGSN and the IM_GSN (GLk-interface)	36

Annex B (informative): Change history37

Explore Litigation Insights



Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.