
GSM

The **GSM**
System for
Mobile
Communications



Michel MOULY

Marie-Bernadette PAUTET

Mont Poudet

4-27-00

The **GSM**
System for
Mobile
Communications

Michel MOULY
Marie-Bernadette PAUTET

This book is published by the author's company, Cell & Sys. Correspondence, in particular for the orders, but also for comments, should be mailed to:

CELL & SYS
4, rue Elisée Reclus
F-91120 PALAISEAU
FRANCE

Telephone : + 33 1 69 31 03 18

Facsimile : + 33 1 69 31 03 38

Web site : [http :/ /perso.wanadoo.fr/cell.sys/](http://perso.wanadoo.fr/cell.sys/)

Copyright © 1992, **Michel MOULY and Marie-Bernadette PAUTET**

All rights reserved. No part of this book may be reproduced, translated, or utilised in any form or any means, electronic or mechanical, including photocopying, recording, or any information storage or retrieval system, without permission in writing from the authors.

All drawings are original, and all corresponding rights reserved.

The name and logo GSM (and "Global System for Mobile communications") are registered.

International Standard Book Number: 2-9507190-0-7

CONTENTS

Foreword, by Thomas Haug	7
Contents	11
Preface	17
Chapter 1 - Setting the Scene	23
1.1. A Little Bit of History	24
1.1.1. B.G. (Before GSM)	24
1.1.2. The Genesis of a Standard	28
1.1.3. Organisation of the Work	29
1.1.4. The GSM MoU	32
1.1.5. Technical Choices	33
1.1.6. The GSM Technical Specifications	37
1.2. Cellular Systems	39
1.2.1. General Aspects	39
1.2.2. Cellular Coverage	40
1.2.3. Radio Interface Management	43
1.2.4. Consequences of Mobility	44
1.2.5. Roaming	46
1.3. GSM Functionalities	47
1.3.1. GSM: a Multiservice System for the User	47
1.3.2. GSM: a System for the Operator	72
Specifications Reference	75
Chapter 2 - Architecture	79
2.0.1. The three Description Axes	80
2.0.2. Frontiers of the System: Where are the Borders of GSM?	84
2.0.3. Internal GSM Organisation	87
2.1. Sub-Systems	89
2.1.1. The Mobile Station (MS)	89
2.1.2. The Base Station Sub-System (BSS)	94
2.1.3. The Network and Switching Sub-System (NSS)	100
2.1.4. The Operation Sub-System (OSS)	105

2.2. Functional Planes	108
2.2.1. Layer Modelling	109
2.2.2. Transmission	113
2.2.3. Radio Resource Management (RR)	114
2.2.4. Mobility Management (MM)	114
2.2.5. Communication Management (CM)	115
2.2.6. Operation, Administration and Maintenance (OAM)	116
2.3. Interfaces and Protocols – An Overview	118
Specifications Reference	121
Chapter 3 - Transmission -	125
3.1. Modelling Principles	126
3.2. An End-to-End View of Transmission	128
3.2.1. Speech	128
3.2.2. Non Speech Services	132
3.3. Transmission inside GSM	149
3.3.1. Architecture	149
3.3.2. Speech	154
3.3.3. Data	166
Specifications Reference	184
Chapter 4 - The Radio Interface	187
4.1. The Needs	188
4.1.1. User Data Transmission	189
4.1.2. Signalling	190
4.1.3. Idle Mode	191
4.2. The Multiple Access Scheme	195
4.2.1. The Time Axis	197
4.2.2. The Frequency Axis	217
4.3. From Source data to Radio Waves	227
4.3.1. The Bursts	231
4.3.2. Interleaving and Channel Coding	238
4.3.3. Ciphering	248
4.3.4. Modulation	249
Specifications Reference	258

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.