The Economics of Mobile Telecommunications

The mobile telecommunications industry is one of the most rapidly growing sectors around the world. This book offers a comprehensive economic analysis of the main determinants of growth in the industry. Harald Gruber demonstrates the importance of competitive entry and the setting of technological standards, both of which play a central role in the fast diffusion of technology. Detailed country studies provide empirical evidence for the development of the main themes: the diffusion of mobile telecommunications services, the pricing policies in network industries, the role of entry barriers such as radio spectrum and spectrum allocation procedures. This research-based survey will appeal to a wide range of applied industrial economists within universities, government and the industry itself.

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A1 Classification of radio frequencies
Preface

This book distils years of work on the mobile telecommunications industry. I became interested in this industry for professional reasons during the mid-1990s, a period when the industry was making the jump from a premium service industry for mostly professional users to a truly mass market. In my capacity as an applied industrial organisation economist, I had the unique opportunity of evaluating the business plans and strategies of a large number of mobile telecommunications firms inside and outside Europe. This provided me with valuable insights into the functioning of this fascinating industry, as well as into its technological and operational concerns.

This book makes extensive use of previously published material. It thus also benefits from joint work done with Marion Hoenicke, Tommaso Valletti and, in particular, Frank Verboven. The credit to them is given in the appropriate sections throughout the book and the relevant papers are quoted in the bibliography. Researching and writing articles with all of them was an intellectually very rewarding experience, and I owe them my thanks. I also received many useful comments and hints from colleagues within the EIB and from the academic world. I would like to thank Tommaso Valletti and two anonymous referees for having read the manuscript and for their detailed comments. Ultimately, all responsibility for the views expressed remains with the author, and they do not necessarily reflect those of the European Investment Bank.
Abbreviations and acronyms

Telecommunications terms

AM Amplitude modulation
AMPS Advanced mobile phone service
ARPU Average revenue per user
C-450 German analogue mobile standard
CAMEL Customised application mobility enhanced logic
CCIR International Radio Consultative Committee
CDMA Code division multiple access
CDMA 2000 A 3G system based on CDMA
CEPT European Conference of Postal and Telecommunications Administrations
CLEC Competitive local exchange carrier
CPP Calling party pays
CTIA Cellular Telecommunications Industry Association (US)
D-AMPS Digital AMPS = US-TDMA
DCS 1800 Digital communications system = GSM 1800
DECT Digital enhanced cordless telephony
EDGE Enhanced data GSM environment; also 2.5G
ERC European Radio Communications Committee
ERO European Radio Communications Office
ETSI European Telecommunications Standardisation Institute
FDMA Frequency division multiple access
FM Frequency modulation
FTM Fixed to mobile
GPRS General packet radio service; also 2.5G
GSM Global system for mobile communications (formerly Groupe système mobile)

GSM 900 GSM in the 900 MHz band
GSM 1800 GSM in the 1800 MHz band = DCS 1800
GSM 1900 GSM in the 1900 MHz band = PCS 1900
<table>
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<th>Term</th>
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<tr>
<td>HLR</td>
<td>Home location register</td>
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<tr>
<td>HSCSD</td>
<td>High-speed circuit switched data</td>
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<td>iDEN</td>
<td>Integrated digital enhanced network</td>
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<td>IMT-2000</td>
<td>International mobile telecommunications system: the ITU definition for 3G</td>
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<td>IMTS</td>
<td>Improved mobile telephone service</td>
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<td>IOT</td>
<td>Inter operator tariff</td>
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<td>IS 95</td>
<td>Interim standard (US) describing the CDMA air interface</td>
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<td>IS 136</td>
<td>Interim standard (US) describing the D-AMPS air interface</td>
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<td>ITU</td>
<td>International Telecommunications Union</td>
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<tr>
<td>JDC</td>
<td>Japanese digital cellular = PDC (Japanese digital mobile standard)</td>
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<td>JTACS</td>
<td>Japanese TACS</td>
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<tr>
<td>MSC</td>
<td>Mobile switching centre</td>
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<td>MTF</td>
<td>Mobile to fixed</td>
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<td>MTM</td>
<td>Mobile to mobile</td>
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<tr>
<td>MVNO</td>
<td>Mobile virtual network operator</td>
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<td>NMT</td>
<td>Nordic mobile telephony system (in 450 and 900 MHz bands) (Scandinavian analogue standard)</td>
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<td>NTT</td>
<td>Nippon Telephone and Telegraph Cellular System (Japanese analogue mobile standard)</td>
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<td>Ofetel</td>
<td>Office of Telecommunications (UK)</td>
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<td>ONP</td>
<td>Open network provision</td>
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<td>PCN</td>
<td>Personal communications network (UK) operating at 1800 MHz = GSM 1800</td>
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<td>PCS</td>
<td>Personal communications services (US, Japan) operating at 1900 MHz</td>
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<td>PDC</td>
<td>Personal digital cellular (Japanese digital mobile standard)</td>
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<td>PHS</td>
<td>Personal handy phone (Japanese cordless system)</td>
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<td>PLMN</td>
<td>Public land mobile network</td>
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<td>PMR</td>
<td>Private mobile radio</td>
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<td>PSTN</td>
<td>Public switched telephone network</td>
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<td>RBOC</td>
<td>Regional Bell operating companies (US)</td>
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<td>RC 2000</td>
<td>Radiocommunication 2000 (French analogue mobile standard)</td>
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<tr>
<td>RPP</td>
<td>Receiving party pays</td>
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<tr>
<td>RSA</td>
<td>Rural Statistical Areas (US)</td>
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<td>RTMS</td>
<td>Radio telephone mobile system (Italian analogue mobile standard)</td>
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<td>SIM</td>
<td>Subscriber identification module</td>
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<td>SMS</td>
<td>Short message service</td>
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<td>SNR</td>
<td>Signal-to-noise ratio</td>
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List of abbreviations and acronyms

- TACS: Total access communications system (an analogue mobile standard)
- TDD: Time division duplex
- TDMA: Time division multiple access (also D-AMPS)
- TD-SCDMA: A 3G system based on CDMA
- TETRA: Trans-European trunked radio communications
- TIA: Telecommunication Industry Association (US)
- UMTS: Universal mobile telecommunications system
- UTRA: UMTS terrestrial radio air interface
- VLR: Visitors’ location register
- VPN: Virtual private network
- W-CDMA: Wideband CDMA (the basis for UMTS)
- WRC: World Radiocommunication Conference
- 1G: First-generation (analogue) cellular technology
- 2G: Second-generation cellular technology
- 2.5G: Enhanced 2G (GPRS, EDGE)
- 3G: Third-generation cellular technology

General terms
- ANSI: American National Standards Institute
- BTA: Basic trading areas (US)
- CAGR: Compound annual average growth rate
- CEE: Central and Eastern Europe
- ECPR: Efficient component pricing rule
- EMU: European Monetary Union
- GDP: Gross domestic product
- ITC: International Trade Commission
- JV: Joint venture
- LRIC: Long-run incremental cost
- M&A: Mergers and acquisitions
- MoU: Memorandum of Understanding
- MSA: Metropolitan Statistical Areas (US)
- MTA: Major trading areas (US)
- PPP: Purchasing power parity
- R&D: Research and development
- ROCE: Return on capital employed