Preface

With the rapid growth of the wireless mobile applications, wireless voice has begun to challenge wireline voice, whereas the desire to access e-mail, surf the Web or download music (e.g., MP3) wirelessly is increasing for wireless data. While second generation (2G) cellular wireless systems, such as cdmaOne1, GSM2 and TDMA3, introduced digital technology to wireless cellular systems to deal with the increasing demand for wireless applications, there is still the need for more spectrally efficient technologies for two reasons. First, wireless voice capacity is expected to continue to grow. Second, the introduction of high-speed wireless data will require more bandwidth.

While the current 2G technologies can support wireless data using cdmaOne circuit switched data or general packet radio system (GPRS), there is clearly the need for more spectrally efficient wireless technology given the limited spectrum available in the wireless bands.

The ability to provide more spectrally efficient voice capacity and spectrally efficient high-speed wireless data has been the focus of third-generation (3G) technologies.

Three important changes have taken place over the last year that will force us to change the way mobile networks develop services to their users:

- Changes in the expectations of users — the boundaries between “core” network services and “value added services” in mobile communications networks are increasingly blurred. Most importantly, the services and content that users expect to receive are no longer the massively produced homogenous things of the past; they are tailored services that are probably only appealing to thinner segments of the population;

- An imbalance between network operators and independent application developers in the "value network" for the provision of network-dependant services; and
- The long-awaited launch of next generation networks and handsets.

The answer to the above challenges lies in leveraging the deployment of next-generation networks to bring in the myriad application developers into an environment that harnesses their nimbleness. Network operators have today the tools to deploy environments that would allow the challengers to work better by working within, and in partnership with, the network operator. The opportunity to the operators runs through a change in their engineering focus that will enable a dramatic change in their business model.

The business model calls for gathering as many of the small "challengers" in as possible; making it worth their while to work with, rather than against, the operator, and insuring that operators get a larger cut of any transaction than simply being a bit pipe.

This change in the business model would imply that today's operators would have to change their current focus and processes greatly. They would need to recognize that their new "partners" are an integral part of the business strategy and treat them accordingly, by providing easier access to operators' business processes.

A sea change in engineering focus will be necessary to allow this business model to succeed. It will be necessary to change our understanding of what "core network" and "value added services" (VAS) are. VAS infrastructure will have to move to the core, at least intellectually. Moreover the nature of the VAS infrastructure will have to change. Operators will steel need to deploy robust "telco grade" systems, but these systems will be tooled to serve as the launching pad for dozens, or thousands, of applications brought forward by the new partners.

This book explores these challenges and their implications on the development of future services.

Purpose of the Book

This book is a pioneering initiative to develop an interdisciplinary view of wireless systems, drawing upon the best work of diverse streams of economic and technological researches.

Researchers have conducted extensive studies and developed theories focused on specific parts of the challenges generated by mobile and wireless systems.

This book draws together these varied perspectives and places them in the hands of managers and students.

These insights have never been more needed. As the competitive environment becomes increasingly dynamic, managers need fresh perspectives and a sharply tuned understanding of business opportunities with mobile services and applications. This is the goal of this book.

Since the perspectives developed from different streams of research and theory, there is not a perfect fit. Nor is the goal of this work to produce one formulaic answer to the complex challenge of mobile and wireless systems. Instead, the following chapters offer diverse perspectives on analyzing strategy and diverse tools for formulating strategy.

Organization of the Book

The book is organized into six main parts and 12 chapters.

Section I (Chapter I) is intended to describe changes in competitive advantages deriving from the development of Third Generation services. **Chapter I** provides the theoretical framework of competitive analysis and it focuses on value chain strategy framework giving an analysis of wireless market attractiveness and changes in competitive advantages. Five scenarios are outlined and validated in order to analyze the behavior of systems not only in management but also in environment change, politics, economic behavior.

Section II (Chapters II-III) considers determinants of mobile technology adoption from the user's context. In this part, **Chapter II** focuses on identifying the technology and non-technology factors that corporations consider important in their decision to deploy devices designed for mobile telephony and mobile data services. It also considers the approval steps in decision-making, the extent and importance of 3G and beyond as it relates to web-enabled cell phones, and the functional areas of use of cell phones.

Chapter III discusses requirements for uptake to occur in specific sectors where a value proposition for mobile data services has been identified and yet adoption rates have varied. Adoption of mobile data services refers to organizational-related solutions as well as service innovations related to the product or service delivered to end-users.

Section III (Chapter IV-VI) surveys the most business opportunities with mobile services and applications. In this part, **Chapter IV** presents a framework derived from the literature to aid the development of viable business models

expected from the amalgamation of mobile telecommunication and space infrastructure. It also identifies the various actors involved in the delivery of these services.

Chapter V introduces the basic ideas and characteristics underlying the concept of ubiquity commerce. It discusses market drivers and applications of u-commerce as well as the underlying technology and the benefits and challenges of u-commerce.

Chapter VI explores the opportunities offered by 3G services/business applications to SMEs, making inferences from the long term research project and providing a broad critical outlook on future opportunities for SMEs to benefit from 3G services.

Section IV (Chapter VII-VIII) explores main technical challenges. In **Chapter VII** a multi-layer ATM architecture is proposed for the interconnection of current and future mobile communications nodes. Moreover, facing the huge expansion of transmission interconnection network that will support current and future generation mobile communications, a modification of the standard ATM cell structure is introduced in order to efficiently support user mobility functional procedures. The proposed ATM architecture is integrated over a suitable, with respect to region and capacity, physical interface, consisting of SDH or SONET for wide area topologies, wireless links for outdoor areas and LED - POF combination for indoor areas. Being an interesting alternative over copper or traditional fiber, POF characteristics, and performance issues are analyzed.

New business opportunities for mobile, wireless and fixed networks are going to require managed packet-based services; this requires SLAs that relate to the level of QoS purchased, and the measurement (monitoring) of information loss and delay at the packet level. **Chapter VIII** investigates the two available measurement techniques: passive and active monitoring and it proposes some ideas which may enhance accuracy.

Section V (Chapter IX-X) deepens security and privacy issues related to mobile and wireless systems development. In this part **Chapter IX** focuses on smart card in mobile communications as a service platform and as a marketing instrument for the network operator. The (Universal) Subscriber Identity Module—(U)SIM—is the network operator's "business card" that is handed out to the end-user. The design of the artwork printed on the smart card, the packaging as well as the functionality directly influence the positioning of the operators' brand in the market. The smart card as used in mobile communications enjoys a high reputation and is very important for the network operators. It does not only provide security and trust thus securing the revenues of the network operator but is also a platform for value added services. **Chapter X** focuses on wireless local area network security evolution and WLAN security threats. Special attention is given to user authentication schemes and to protec-

tion of data communication. WPA is also compared with the present WLAN security protocol WEP. Other covered issues are available WPA supported technology and open source WLAN security software. A WLAN designed according to the new security standards is a real alternative to a secure enterprise LAN and also a reliable platform for e-commerce.

Chapter XI discusses the need for privacy and security in mobile systems and presents technological trends which highlight that this issue is of growing concern.

Finally, in **Section VI**, **Chapter XII** aims to investigate some among the current technical, business, financial, and regulatory visions associated with the effective evolution of third generation (3G) networks and services, in particular to fulfil the great market realities, the expectations and 3G's significant potential in building the EU Information Society. The chapter depicts data related to the current state of play for 3G communications in Europe, with specific emphasis given to the underlying technologies and probable standardization options (both for network and terminal equipment).

Wireless mobile technologies are a major driver to realize the way forward to a knowledge-based economy, in terms of consumer demand, productivity, competitiveness and job creation. Under suitable terms, this may create enormous potential and significant investment incentives, for the full recovery of the wider ICT sector. 3G is likely to play a key role in providing widespread access to the Internet and to interactive services, thus maximising consumer choices and providing flexibility for the market itself.

Concluding Remarks

I should note that all of the chapters were reviewed by either the editor or by external reviewers via a blind review process. Both chapters submitted by academic researchers and by the professionals working from firms in industry, were submitted to external reviewers who did not know the authors' names and affiliations. In this way, papers were given a through scrutiny by experts in the fields of mobile and electronic commerce. In total, we were quite selective regarding actually including a submitted chapter in the book.

I'm delighted to present this book to you and I am proud of the many outstanding chapters that are included herein. I'm confident that you will find it to be a useful resource to help your business, your students, or your business colleagues to better understand the topic of 3G wireless.

Endnotes

1 TIA/EIA/IS-95B. Mobile station–base station compatibility standard for wideband spread spectrum cellular systems. April 1999.

2 Halonen T, Romero J, Melero J. GSM, GPRS and EDGE Performance. John Wiley & Sons, Ltd, 2002.

3 TIA/EIA/IS-136. TDMA cellular PCS. April 1999.