UMTS Networks
Architecture, Mobility and Services

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Reviews of Services for UMTS:

“In the last few years we have heard fantastic things about 3rd generation systems and the incredible services they will provide. Unfortunately most of these were just that: fantastic and incredible. On the other hand most of us missed the point of what the next generation mobile can enable and what real new services are becoming possible. This book is a must read if you want to understand options, future services and dream about them from a rock solid standpoint”

Roberto Saracco, Director, Future Centre, Telecom Italia Lab

“This book is a visionary outlook into the world of UMTS and its compelling services. It outlines how modern tools can be used in mobile marketing to add value and utility to the user”

Andreas X. Müller, Executive Board, 12Snap AG

“This is certainly the most comprehensive work I have seen on the subject. The book explains how various elements of technology, product development and system integration have come together to build successful 3G services”

Regina Nilsson, Director, Telecom Practice, PwC Consulting, Northern Business Unit

“The authors provide an insightful discussion into a wealth of service possibilities that could be delivered by UMTS. This will potentially offer significant revenue opportunities and bring values to mobile operators and may also enable service enhancement with existing access technologies”

Dr. Stanley Chia, Director, Group R&D - US, Vodafone

“In this book the editors succeed at building a better understanding of UMTS. This should help telecom operators, equipment manufacturers, content providers and the capital markets manage their $1 trillion bet on the success of 3G”

Assaad Razzouk, Deputy Head Global Corp Finance, Nomura International plc

“A welcome change from the technology-led literature, Services for UMTS focuses on the services and applications end of the mobile multimedia world. Through an interesting framework the editors have managed to explain how value can be created from both a user and a service provider perspective”

Dr Didier Bonnet, Global Head of Strategic and Business Consulting, Telecom and Media Practice, Cap Gemini Ernst & Young

“This book explains some of the compelling services the players in the wireless industry will be able to develop and deploy based on the 3G and 4G infrastructure”

Jeff Lawrence, Director of Technology, Intel

“Services that customers need will be the only driver for 3G. This book provides a framework for the launch of UMTS, but more significantly strong ideas for future demand and capability”

Mike Short, Vice President mmO2, Past Chairman GSM Association
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SERVICES
FOR UMTS
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SERVICES FOR UMTS
CREATING KILLER APPLICATIONS IN 3G

Edited by

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Foreword

One of the fundamental questions being asked about the 3rd Generation (3G) or UMTS business is ‘Will it be a profitable business and a viable investment?’ There are many opinions and views on this subject but only time will reveal the answer. Of course it is easy to say that UMTS will be a resounding success. It is even easier to take a marketing view of the world where theory is the basis for your UMTS messages and communicating services more relevant to 2010 are your marketing objective. We have to ensure we are not victims of our own technological hype and enthusiasm for the future. If we over sell the technology and increase user expectations beyond the realms of reality we run the risk of alienating the customer and failing in the delivery of a totally new UMTS user experience.

There are few successful revolutions in our age and UMTS will not change our lives over night. What it will do is bring a new way to interact with people, devices, information and businesses. UMTS will change our lives but gradually, not over 40 years, 20 years or even 10 years which has been the past norm but in a shorter rhythm, an Internet time span that is measured in tens of months not tens of
years. This speed brings with it the need for operators to be responsive, adaptive and nimble.

The Internet has changed our lives for the better. Consumers have more power than they had only a few years ago and this is good for industry since it creates a competitive environment where price, quality and service are the winning combination. We see this in the success of companies that provide more personalised services via electronic access to content. However, it is the success and growth of Mobility that will have the greatest impact on how we communicate and interact with society. If Content is King in the Internet, it will be Personalised Content that is relevant, timely and localized for the user’s situation that will be King in the Mobile Internet.

The current Internet has been a victim of its own success. The euphoria of the early years is fading slowly as click through rates fall and advertisers re-evaluate the effectiveness of the Internet business model. At the heart of the problem is invoiceability. Without end-to-end control over the transaction there is no validation of the value that each user contact generates. In effect the Internet has created the perception that there is such a thing as a “free lunch” or in some cases even a “profitable lunch”.

Serious readers know better. It will be mobile users that create new demands on content. Mobility requirements will change the Internet into a content provisioning environment that creates real value. Value that consumers and executives will pay for. Our industry has to create a “win-win” situation between subscribers, operators, content providers, developers and vendors. New partnerships are critical, in which new entrants can prosper.

I believe that 3G is fundamentally a good business, and exciting. Market acceptance of 3G services on a global scale is within reach. Key words are multimedia, ubiquity, simplicity, affordability, and globalization. The successful companies will understand the changes in user expectations and they will meet them and exceed them. The organizations that do that will own the future. They and their shareholders will be the long term winners.

Alan Hadden
President, GSA
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‘I love deadlines. I like the whoooshing sound they make as they fly by.’

Douglas Adams

Acknowledgements

Our guides, mentors, advisors and gurus

A book like this would not have been possible without the valuable input of our contributors and the many others who helped and inspired us.

We want to take this opportunity to thank a few very special people who have advised us, guided us and in some cases who were kind enough to take time to provide input and critique for this book when it was still in manuscript form.

Among our personal mentors and advisors in understanding the very nature of UMTS have been Ukko Lappalainen, Ilkka Pukkila and Ebba Dähli. For their visions, foresight and guidance we are very grateful. In the areas of econometric modelling and understanding the operator business case for UMTS, we want to thank Hannu Tarkkanen, Timo M Partanen, Paulo Puppoli, Vesa Sallinen, Petro Airas and Harri Leiviskä. In areas of mobile services and their revenues we are very grateful to Claus von Bonsdorff, Nicole Cham, Heikki Koivu, Michael Addison, Timo Kotilainen, and Timo Poikolainen. In understanding the business customer needs of UMTS we thank Julian Heaton, and in residential customer needs Reza Chady and Paul Bloomfield. In helping us understand UMTS operator needs we
thank Merja Kaarre, Carina Lindblad, Jaakko Hattula and Spencer Rigler. We want to remember Tarmo Honkaranta for his leadership in developing and promoting the use of segmentation.

Several visionaries inspired us and specifically we feel a debt of gratitude to Teppo Turkki, Matti Makkonen, Risto Linturi, Taina Kalliokoski, Voytek Siewierski, and Sakuya Morimoto. Both of us have found considerable insight into possible technological future scenarios in Scott Adams’s book ‘The Dilbert Future’.

We are very grateful for the patience and guidance given by John Wiley & Sons, Ltd, especially Mark Hammond. Thank you for your endless patience and steadfast support.

For their patience, understanding, support and encouragement we are truly grateful to our families and friends for the weekends and late nights devoted to this book. Special thanks go to Kay Barrett who read every page of the manuscript and often made sense out of our ideas and text.

It has been a challenge to live by the tight rules we imposed upon our contributors and ourselves and perhaps we can all empathise with Peter de Vries who said “I love being a writer. What I can’t stand is the paperwork.”

We welcome comments or suggestions for improvements or changes that will improve future editions of this book. The e-mail address for suggestions is s4umts@hotmail.com.

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Kotler, Porter and other eminent marketing gurus have preached that the first step in the marketing cycle is to segment your market. From there you position your product and then target the audience with the right messages. Traditionally this was done by social groupings, A, B, C1:C2:C3 or other demographic methods. Since those early days marketers have been seeking and developing new segmentation strategies and many have been used to good effect, but the global trend is towards ever smaller and more precise segments, approaching the ideal segment of one. A segment of one means that a marketer can target each individual on a one-to-one basis and has the greatest opportunity to take the potential customer through the buying cycle: Awareness, Interest, Decision, Action.

Previously on a practical level it has been almost impossible to segment your target audience in this way, primarily because of cost reasons. Today this is changing with the Internet, where target advertising can be used with reasonable results. If you are accessing a golf page for example you are more likely to see a banner advert that is
golf or maybe sport related. However in UMTS (Universal Mobile Telecommunications System) networks this will change. In the near future, ever tighter segments and more precision in market messages becomes not only possible, but necessary for successful profits.

We are all individuals. We come in different sizes, shapes, colours. We have different needs, desires, wants. We all do things in our own unique way. It is the fact that we are all unique and different that unites us. Once we recognise this we can start to exploit it in our marketing. As soon as we can build an individual relationship with our customers, when we know what they want, what they need, how they do things, run their work life, personal life and how they manage their relationships we can show them how they can make their lives easier, more profitable and more fun. Sounds too good to be true? Not if you are a mobile phone operator. Voice has already gone wireless and data is the new frontier.

1.1 Enriching the experience. From ears to eyes

At the heart of this UMTS experience will be the terminal and a new way of using the phone. The mobile subscriber will not just talk, they will be able to view multimedia images, watch video clips, listen to music, shop, book a restaurant table and surf the net. And, since they will always be connected to the network, they will receive important and timely information.

The strong growth in mobile voice will continue in mobile data. There were around 630 million mobile phone users in 2000 and this number is expected to grow to 1 billion by the end of 2002\(^1\). For comparison there are less than 300 million personal computers in the world, connected to the Internet. The UMTS terminal will become a service platform, capable of multiple radio access modes and compliant with open standards and operating systems\(^2\) to enable Mobile Internet and mobile Multimedia Messaging Services.

2 The open standards supported by Nokia terminals include WAP; Bluetooth; EPOC; SyncML; HSCSD, GPRS, EDGE and WCDMA.
The growth of mobile subscribers has been remarkable over the past 10 years. This has been driven mostly from Europe and Asia where GSM has been the dominant technology. The adoption of WCDMA by operators in Europe, Asia, USA, Latin America, Japan and Korea will see growth continue in the 21st century. Source: EMC World Cellular Database

Current mobile networks are feeling the pressure of exceeding their design specifications. Nobody expected 70% of the population to have and use mobile phones when the current mobile technologies were standardised some two decades ago. The new UMTS environment is designed not only for large numbers of users, but also for varying types of services on the network. New UMTS services are enabled with a QoS (Quality of Service) model for the terminal as defined in 3GPP global standards. This model has several service classes ensuring that the radio connection is capable of supporting various types of applications:

- **conversational real time traffic**, such as multimedia conferencing
- **real time streaming traffic**, such as online audio/video reception
- **interactive traffic**, such as Internet browsing
- **background traffic**, such as downloading of mail

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3GPP is the standardisation body for 3G WCDMA technical specifications.
Operators will be able to define the QoS level for each UMTS service depending on the price the customer is willing to pay. For services with a higher QoS, like video streaming, customers will be willing to pay more. Services that are not delay sensitive like e-mail can use the background traffic QoS class but will be charged at a lower rate than premium delay sensitive services.

Preferred device

The mobile phone is already the preferred voice device for hundreds of millions of users. Why? Because it is personal. It is the only device that is in our possession 24 h a day. It can contain all our important phone numbers, with names so they are easy to remember and find. It can be our diary, our notepad and now our access to the Internet and information that we need while moving around. Yet there is still one thing that many people fail to appreciate about the mobile phone. It is not just about voice or data or accessing people or content. It is how the mobile phone can reflect individual personalities, lifestyles and our moods. The popularity, and operator profits of personalised ring tones are a clear indication of this. Here we are experiencing the first signs that consumers and business users in the near future will expect and demand unique and personalised products and services. The companies who recognise and act on this knowledge will be the undisputed leaders in their respective markets.

Now it is necessary for us to state the obvious. UMTS will be about services not technology. Even more than that, UMTS will be about management of our time and content. Technology such as WCDMA (Wideband Code Division Multiple Access) and IP (Internet Protocol) are only the enablers for the Mobile Internet. We all know that, but what does it mean? Basically if you do not get your act together and create what we call ‘invoiceable’ and personal services you will be a has-been in the Mobile Internet. The winners will be those companies that can create a multitude of user friendly services that people will pay for. Unlike the Internet community where ‘free’ is the byword for service, mobile users pay for their communication. They pay for voice since they value it. They are willing to pay for text messaging because it is seen as superior in so many situations where for example a fast, short answer is needed. Mobile subscribers pay for WAP (Wireless...
Application Protocol) access if it provides good content and for many
WAP is a valuable service that they are willing to pay for. It is rela-
tively simple to extrapolate this to a situation where users are willing
to pay for new value creating UMTS mobile services that are indivi-
dually personalised.

This is where the arguments start. Or should we say the interactive
discussions begin. Users will not, and in fact they can not pay indefi-
nitely for more and more content. We all have a limit to the amount of
disposable income we have for our personal communications. But this
view will change. Lets consider how much of our allowance we spent
on telecommunications when we were teenagers. If you are over 25
like we are, then the answer is zero. Maybe a few calls to the girlfriend
or boyfriend from a payphone, but mostly our ‘telecoms spend’ when
we were teenagers, were calls from our parents’ phone at home.

Spending substitution

Teenagers today in Finland spend up to 90% of their allowance on
their mobile phone bill. Over 50% of this bill can be SMS (Short
Message Service) text messaging. This group of society are spending
less on clothes, cinema and eating out. They are using text messaging
for chatting, sending jokes, sharing simple pictures, providing infor-
mation on what, where, who and how to their friends and even dating
over SMS. The youth market do not leave voice mail messages since
this is too time intensive. Its not instant. They send a text message. It
is faster and more simple. We are now more likely to send work
related text messages since it is less intrusive when people are in a
meeting. Yes we admit that we are sending more and more text
messages, but don’t tell our kids.

We think the trend for UMTS is becoming clear. In the early 90’s
when GSM (Global System for Mobile communications) started it
was the business user who was the target customer. In those days
there was no youth market. No pre-paid. No text messaging. No
mobile access to e-mail. Who even had reliable e-mail back then?
Penetration rates for mobile phones of 30% of population were
considered futuristic, for the dreamers, unthinkable. How we re-
learn and re-evaluate our opinions. What is certain is that any
UMTS operators who ignore any market segment do so at their
peril. We believe that all operators have to be ready to target multiple markets from the beginning and be prepared for the mass market take-up for any service from day one. It will be the mass market that generates the revenue growth. The mass market is where the greatest potential is. The mass market will be the early adopters. Kotler will have to re-write Marketing Management.

![Vertical Integration in Value Chain](image)

The UMTS operator will extend their reach into new areas of the service distribution channels. The extent to how far they go will depend on each operator’s strategy and capability to take compete with the new and existing players in other parts the UMTS value chain.

### 1.2 Fixed internets, second generations, and UMTS

The services developed for UMTS networks will be products of the most complex, interconnected and intelligent machine man has created. It is at the heart of the convergence of fixed and mobile networks, voice and data, the existing fixed and emerging mobile Internets, and the convergence of digital content and wireless delivery. These various trends that relate to the overall convergence in telecommunications will have a great deal of impact on the UMTS
environment. It is not the purpose of this book to go into depth regarding these networks. Chapter 14 briefly covers the technical side of the UMTS network but readers who want to learn more should refer to the book ‘WCDMA for UMTS’ by Holma and Toskala, also published by John Wiley & Sons.

How browsers changed the internet

From its birth in the 1960’s the Internet looked and felt basically the same until the early 1990’s. Techno-elitist researchers, mostly from America with a few West-Europeans, primarily using mainframe computers with Internet connection to different forms of person to person(s) communication and the exchange of files. Nobody had heard of the ‘Worldwide Web’ or WWW. All that changed when Mosaic was launched as the first WWW-browser and the Internet was never the same again.

Still in the early 1990s the Internet had its own decentralised information sharing system called Gopher. Many universities and organisations which had Internet connection in those days had their own Gopher homepages. It was university students who started to experiment with the Internet and became the first users of non-academic services, like checking the daily menu of their university cafeteria from Gopher just like they can do now on the WWW.

Even after seeing Mosaic and WWW, there were many devoted Gopher users who believed that the WWW was nothing more than a facelift of Gopher. It had a nice graphical interface that could display online pictures and it had a hypertext-structure which made page creation easier. The early thinking was that the WWW could never replace Gopher. Gopher already had a huge amount information and nobody would convert it to WWW-format. Gopher had logical hierarchical structures while the WWW was an incomprehensible mess of hypertext. Creating content for the WWW would be too difficult for typical end-users because it required a new mark-up-language while Gopher worked mostly with text-files. And besides, ‘all users’ knew how to use Gopher already.

How wrong those predictions were. Remember that these were near unanimous opinions by the best Internet experts and users of that time. As we move towards the world of mobile data services those lessons
should be remembered. In only a few short months the WWW had more information than Gopher had built up in a decade. Its graphical interface and hypertext-structure provided excellent usability and end-users quickly learned to create new content. The Internet was transferred from mainframes to PCs. It became a mass-market service. It became commercial. The scope of its services widened. Today hardly anybody bothers to think of how a web page might seem to a mainframe user, but every content provider tests pages on the current WWW-browsers, Internet Explorer and Netscape.

How mobility will change the fixed internet

A similar transformation will happen in the UMTS future when content migrates from the fixed Internet to the Mobile Internet. It may seem like heresy to the hundreds of millions of users of personal computers, but already mobile phones outnumber personal computers by a factor of 3:1. Very soon most of the mobile phones will be Internet-enabled. The transformation is inevitable.

It is now widely recognised that the number of web enabled mobile phones will overtake the number of web browser PCs. In some countries like Japan and China, the first experience of browsing the Internet will be from a mobile phone.
The Internet will be accessed by a multitude of different devices; it will become more international; its business-logic will change and it will have new or at least enhanced services. The predominant Internet access device will change from the PC used today to the mobile phone in only a few short years. The content producers will write their primary content to be delivered by the most prevalent device – and that will be the UMTS mobile terminal. Most content will migrate from the fixed Internet to the mobile world faster than the transformation from Gopher to the WWW.

From client-servers to clients-profiler-servers

Currently most of the Internet users access the Internet only from one device: a PC (Personal Computer) either at work, in the home or at school. Some people use other means such as Internet cafés and libraries but this is still a small percentage of total usage. Several new technologies are being introduced to allow Internet access via other devices like digital TV over satellite. There are also small pocket size devices including PIMs (Personal Information Managers), PDAs (Personal Digital Assistants) some combined or integrated with mobile phones that allow Internet access.

In a few short years it will be common to use multiple devices to access and receive mobile content and browse information that has until now been primarily available via the fixed Internet. Many people will of course use their PC or similar devices at work as their preferred device to access the Internet, then, on the way home their cars will connect their navigation and information systems to the Internet. At home people will be consuming content via the digital television which will download various types of content from the Internet like pay-per-view movies. While watching TV many people will have an Internet access device such as an Internet browsing tablets to enhance and supplement their TV viewing, for example while watching a sports game, to check on the status of scores in other games or to browse other Internet sites.

Throughout the day that same person will use the UMTS device to access the mobile content for various services of convenience. It is important to recognise that in the near future people will access content from a multiple of devices and in a number of different
ways. We will no longer have only one access method. This is very similar to the way the use of radio developed. Early on, families had only one radio, and the whole family would gather around it to listen to specific programmes. As families started to gain more radios per household, they also started to tune in and out of favourite channels from different radios during the day, from the wake-up clock-radio in the bedroom, to the kitchen radio, to the car radio, etc. The variety and usage increased so that definite identifiable segments emerged with differing listening patterns.

Currently end-user information is shared between PC client and the Internet server. A simple example is that the browser’s bookmarks reside on the PC while the e-mail inbox resides at the e-mail server. As people will access the Internet from multiple devices, more information must be stored in the network otherwise the current device may not have all the information needed to carry out the transaction. Amongst other things this means a radical re-thinking about Internet ‘cookies’. Cookies are small files that web-sites send to user computers to recognise the users and let the service be personalised. When users return to the same site these files are sent back and the site knows immediately any relevant information about the visitor. This is why many services have you sign up for the first time with personal