

International Telecommunication Union

digital.life

ITU Internet Report 2006

SUMMARY



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Summary

December 2006



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Contents

	introducing digital.life.....	5
1	going digital.....	6
2	lifestyles.digital.....	8
3	business.digital.....	12
4	identity.digital.....	16
5	living the digital world.....	18
	statistical highlights.....	22
	report contents.....	24
	order form.....	27

introducing *digital.life*

digital.life is the eighth in the series of ITU Internet Reports. The report series, which was launched in 1997, has tracked the development of the internet worldwide. Written by a team of analysts from the ITU's Strategy and Policy Unit (SPU), this edition focuses on consumers and looks at how human lives are being continuously shaped and re-shaped by advances in digital technologies.

The report begins by examining the underlying technological enablers of new digital lifestyles, including mobile technology, broadband networks, user-generated content, IPTV and so on (chapter two). It then considers how businesses are adapting to fast-paced digital innovation, how digital access

can be extended to underserved areas, and how policy-making might need to be adapted in the light of rapid media convergence (chapter three). The report also explores the changing nature and role of the digital individual and of digital identity (both abstract and practical) as human lives become increasingly mediated by technology (chapter four). The report concludes with a glimpse of a day in the life of our digital future (chapter five).

The Information Society Statistics in the Annex to the report presents the latest available data for more than 200 economies worldwide in terms of their use of digital information and communication services.

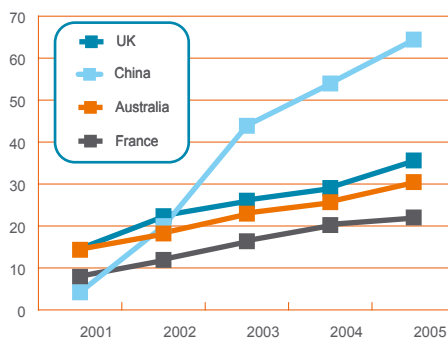
chapter one

going digital

In a sense, humans have always been digital. The digits of the hand have been used to create, innovate, and communicate over the ages. And just as they can be used to represent discrete numbers, in recent times a system of discrete binary digits (zero and one) has been developed, heralding the dawn of the digital age. Digital technologies have been vital to the distribution of knowledge and information, which, as many will argue, are at the core of power in society. Through the use of communication technologies like the internet and the mobile phone, the reach of our relatively short digits has been

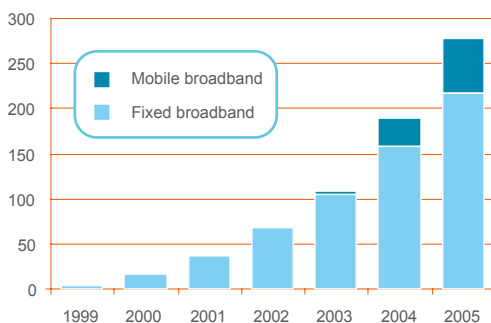
extended to a much larger sphere—that of the global digital world. The thumb is a good example, as expressions like “thumb culture” and “thumb tribes” abound: from the narrow streets of Varanasi (India) to the wide avenues of Barcelona (Spain), people are regularly seen walking, eating, talking and even driving while their thumbs busily tap on the keypad of handheld digital devices. As an industry sector, messaging on mobile phones has in the space of just a few years become a global industry generating around USD 80 billion in annual revenue. It has also, interestingly, taken off faster in some developing

SMS/MMS per user per month, selected economies



Source: ITU, adapted from Eurostat, OECD, OFCOM, China Mobile, China Unicom

Total broadband subscribers, worldwide, millions



Source: ITU Information Society Statistics Database.

Note: «Broadband» is ≥ 256 kbit/s.

countries, such as China, than in many developed ones. The internet, too, has radically transformed businesses and individual lifestyles alike, and enabled people to create and share information and knowledge instantly and on a global scale. Not surprisingly, the global consumption of media today is predominantly in digital form.

The next phase in this digital revolution is the transition from low-speed to high-speed networks. Broadband networks are well advanced in the fixed-line world, where there were some 216 million broadband subscribers across the world at the end of 2005. Slowly but surely, this transition is also occurring for mobile networks, with the advent of mobile broadband, e.g. third generation mobile systems (3G). At the end of 2005, there were some 62 million mobile broadband

users, with services launched in around 60 economies. In addition, wireless local and metropolitan area networks (e.g. Wi-Fi, WiMAX) are starting to make an impact.

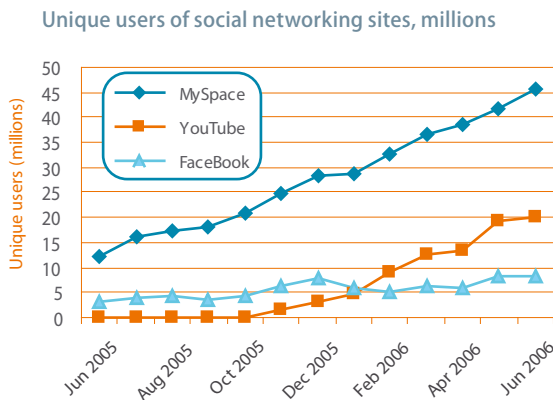
In the future, the digital revolution will take on an entirely new dimension, with the development of ubiquitous networks and pervasive computing based on technologies like RFID (radio-frequency identification) and sensor networks. In a future of digital ubiquity, the world's networks will not only connect people and data, but also things. In this way, mundane daily tasks become increasingly automated, and the technology behind them progressively fades from the perception of the user. This will have important implications not only for society and individual lifestyles, but also for business strategy and policy priorities.

chapter two

lifestyles.digital

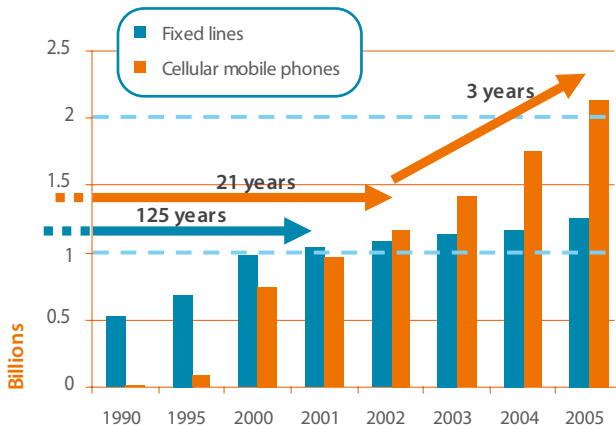
Digital technologies are fast becoming indispensable. A growing array of devices and technologies are on offer today, making users much more mobile. These range from slimmer and faster laptops, to MP3 players with video capabilities and mobile phones with high-speed internet access. While it took around 21 years to reach the first billion mobile users, the second billion signed up in just the three years. By contrast, it took some 125 years to reach the first billion fixed-line users.

The evolution from second to third generation mobile networks is arguably just as important as the jump from analogue to digital, which began more than a decade ago and is proceeding much more rapidly. Broadband networks and media convergence are generating new avenues for distributing digital entertainment. User devices are now multi-functional and increasingly personalized. In the future, advances in connected computing will make it possible for millions of things to have the



Source: Adapted from the Financial Times using Nielsen/Net Ratings figures, 23 August 2006.

Fixed lines & mobile phones worldwide



Source: ITU Information Society Statistics Database.

ability to compute and communicate. The process of digital transformation, driven by technological innovation, is only just beginning.

In both fixed line and cellular markets, the transition to higher capacity networks is accompanied by a shift to IP-based networks. As a consequence, voice over IP (VoIP) usage is on the rise (e.g. through services like Skype or Vonage) but so too is the possibility of watching moving images over IP networks: IPTV technologies introduce an interactive dimension to television,

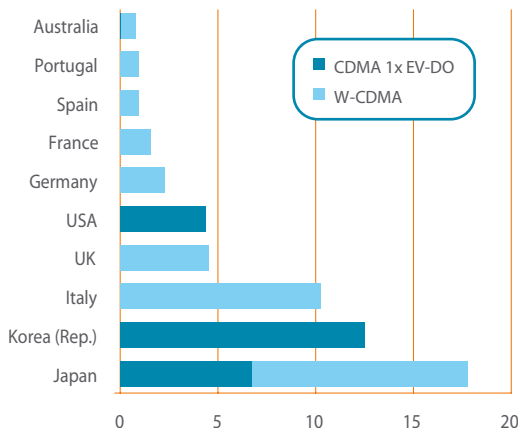
giving viewers more control over what they watch, and when. New technologies such as digital video broadcasting and digital multimedia broadcasting let viewers watch streamed content on mobile devices anytime, anywhere. Entertainment appears to be entering a whole new era.

At the same time, digital technology is having a significant impact on the nature of social interaction. Mobile phones have already changed the way people communicate, arrange meetings and multitask. The internet stimulates

new kinds of networking for both real and virtual identities. Online, users are encouraged to seek out strangers with similar interests and this form of networking has given rise to some of the internet's most active networking websites, such as MySpace and FaceBook. Add to this the possibility of video-sharing and you have the overnight success of YouTube which provides 100 million video downloads each day and has attracted the attention of one of the internet's largest players—Google. Multiplayer online gaming is also on the rise, creating yet another venue for digital interaction. Many users regularly engage in role-playing games, leading alternative “second lives” in cyberspace.

Innovation in digital content is rapidly expanding to other aspects of daily living. Digital homes, with sensor-enabled blinds, online security systems, customized entertainment systems, and intelligent appliances are being developed. With contactless payment systems (e.g. through technologies like RFID), seamless digital transactions are possible online and via mobile devices. Moreover, content can be delivered depending on the preferences and/or location of a user. Such context-aware services are becoming a priority for service providers in a world in which keeping abreast of constantly mutating user lifestyles has become indispensable.

Top 10 economies by number of mobile broadband subscribers, in millions, 2005



Source: ITU Information Society Statistics Database.

Next generation sport

Big, small, digital at the FIFA World Cup 2006

Major global sporting events, such as the football World Cup or the Olympics, tend to act as triggers for the development of the ICT sector. For consumers, the urgency of following the event can justify a purchase while for manufacturers and service providers, it acts as appropriate timing for the release of a new product or service and a focus for marketing efforts.



For instance, many countries timed the introduction of colour television with the 1970 World Cup in Mexico, while in 2002, when Japan and the Republic of Korea jointly hosted the tournament, 3G mobile services were formally launched in Korea during the Opening Ceremony. Thus landmarks in sporting history coincide with milestones in technological progress.

And so to Germany ... Germany 2006 provided a boost for the consumer electronics industry, especially for sales of HDTV-ready television sets and plasma screens. Operators in several countries took the opportunity to launch of mobile TV services. At the opposite end of the screen size spectrum, fans were able to experience crystal-clear pictures on huge screens in cinemas and at so-called fanfests. Using a technology developed under the auspices of ITU, called Large Scale Digital Imagery (LSDI), screens of up to 144 m² broadcast live action to thousands of fans. For those fans unable to get tickets for the sold-out games, here was a chance to participate in an event with family and friends and to enjoy the action which was almost as good as being at the game (and certainly cheaper). In Italy, for instance, the national team's victory on penalties in the final game was watched by around 180 000 people on the Circo Massimo, extending the live experience to far more than could afford to follow the team to Germany.

And what was the lasting memory of the game? Zinedine Zidane's infamous headbutt on Italian defender Marco Materazzi in the closing minutes of extra time shocked and mystified those who saw it live. But within a few hours, it was being analysed on blogs, and posted on social networking sites and video-clip sites like YouTube and animated in amusing ways. Such clips were sent around the world in forwarded emails and now probably fill more capacity on computer hard drives than existed in the whole world at the time of the 1954 World Cup, the first to be broadcast live on television. Technology and sport make a perfect marriage with sport, providing a commercial drive for technological development while ICTs help football to become the beautiful game once more.

Image source: Stock.xchng at www.sxc.hu

chapter three

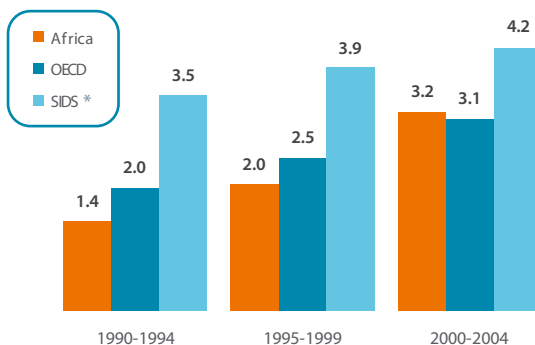
business.digital

However you look at it, digital business is big business. The clearest evidence for this is at the macro-economic level, where the contribution of ICTs to the general economy has grown rapidly, regardless of falling prices. In 2004, telecommunication services contributed some 3.3 per cent of Gross Domestic Product (GDP) worldwide, compared with just 1.8 per cent in 1990, with virtually every single world economy enjoying growth.

On the mobile side, the exorbitant prices paid for 3G licenses, which

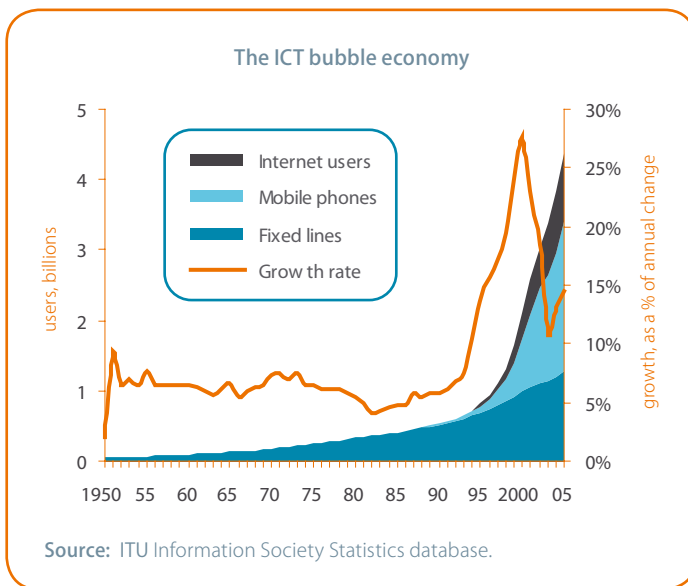
seemed extortionate after the collapse of the IT bubble, now seem more reasonable, particularly given the ongoing expansion of the mobile sector to reach 2.17 billion subscribers at the end of 2005. Of these subscribers, just over ten per cent have already shifted to third generation mobile systems (3G). The reality is that, despite the severity of the crash that affected the technology sector between 2000 and 2003, the underlying networks have simply kept growing with barely a hiccup.

Telecom services as % of GDP



Source: ITU Information Society Statistics Database.

*SIDS=Small Island Developing States



Key factors driving growth include higher-capacity, user-friendly services and a shift to flat-rate billing models. In the mobile broadband market, Japan and the Republic of Korea were early leaders, but Italy and the United Kingdom are catching up fast. However, mobile broadband suffers from the same limitations as fixed-line broadband, when it was first introduced at the turn of the millennium. In many cases, it is complex to use and the quality of service (e.g. for viewing video clips) is sometimes poor, due to capacity constraints, and prices remain high. However, the problems of capacity, quality and price should be resolved as W-CDMA networks shift to HSDPA and CDMA 2000 1x networks

are upgraded to EV-DV and EV-DO. The development of fixed wireless services, such as WiMAX, and the use of dual-mode handsets and data cards will increasingly blur differences between different platforms. Ultimately, the goal is to deliver access to consumers more cheaply and conveniently. Improving technical capabilities of mobile networks will help increase the overall range of delivery platforms available to consumers. As platforms diversify, inter-modal competition will become more important. Those economies that have historically shown the fastest growth in broadband are those in which end-users have the most choice, for instance between DSL, cable modems,

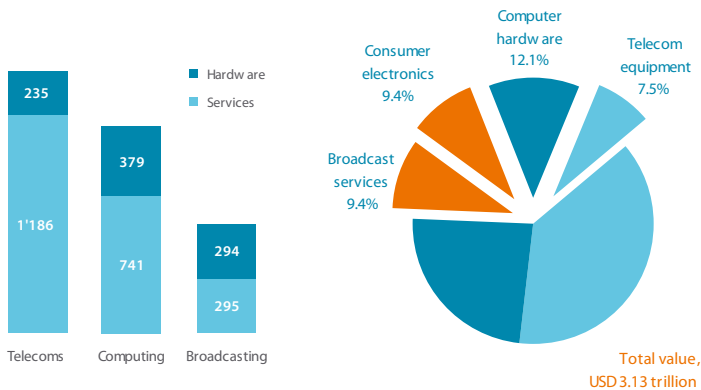
fibre to the home, and now 3G mobile broadband as well.

The requirements of end-users are increasingly at the forefront, as businesses place greater emphasis on understanding demand, particularly in saturated markets. In this respect, the growing trend towards the personalization of services and user-generated value is having a significant impact on re-shaping the industry. First of all, end-users are generating a higher share of networks investment than in the past, as more and more equipment is now owned directly by end-users (e.g. broadband routers). Second, a higher

percentage of revenue now derives from subscription charges and advertising, than from usage charges. Markets are also increasingly global, with a greater share of both revenue and innovation coming from outside the home market of service providers. Finally, competition between different technology platforms is now just as significant as competition within the same market.

All of these factors have an impact on business, but also on policy formulation, which requires a much more integrated approach, and less reliance on traditional sector-specific regulation.

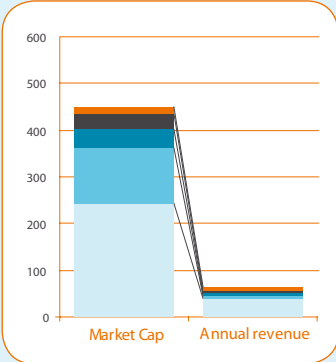
Global ICT market, 2005, in USD bn and in %



Tracking the “Big Fives”

Market capitalisation and annual revenues for the top five companies in the digital content and telecom service sectors

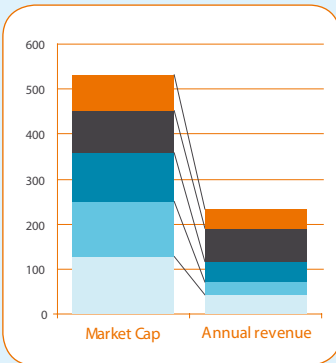
Top 5 digital content companies



Company	Market cap (USD bn)	Annual revenue (USD bn)	Year-to-date
Microsoft	244.8	39.8	31/06/ 05
Google	118.5	6.1	31/12/ 05
Yahoo!	38.0	5.3	31/12/ 05
Ebay	35.4	4.6	31/12/ 05
Amazon	14.3	8.5	31/12/ 05
Totals	451.0	64.2	

Ratio of market capitalisation to revenue=7.02

Top 5 telecom service companies



Company	Market cap (USD bn)	Annual revenue (USD bn)	Year-to-date
Vodafone	128.4	41.3	31/03/ 06
China Mobile	120.6	30.9	31/12/ 05
AT&T	108.0	43.9	31/12/ 05
Verizon	95.1	75.1	31/12/ 05
Telefonica	78.3	42.6	31/12/ 04
Totals	530.3	233.8	

Ratio of market capitalisation to revenue=2.27

Note: Market capitalization data is for 21 July 2006. Annual revenue is for latest available year. Companies are ranked (top five) according to market capitalization rather than annual revenue.

Source: ITU, adapted from Company reports, Finance.Yahoo.Com and Edgar Online.

chapter four

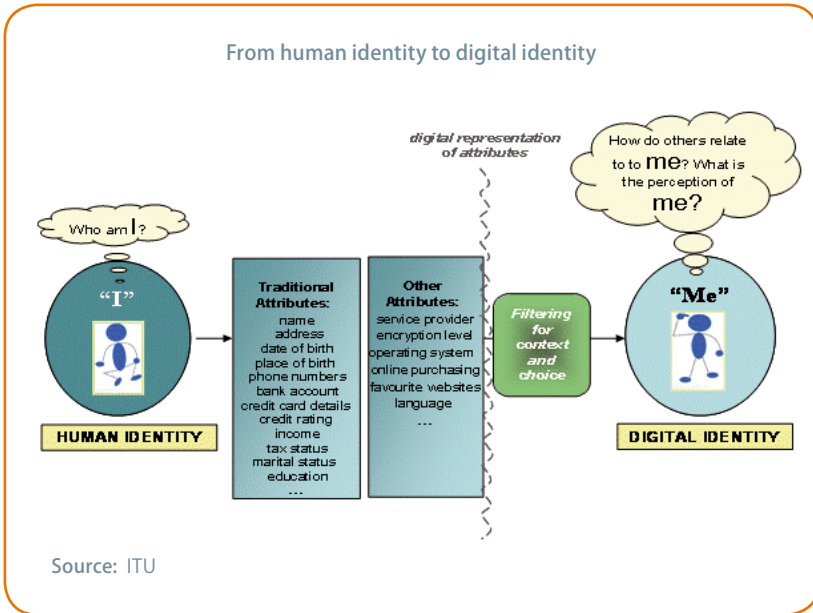
identity.digital

Individuals today spend more and more time using digital means to communicate and transact, be that sending and receiving e-mail, talking on a mobile phone, participating in a social networking site, buying music, booking vacations over the internet, or playing an online game. The complexity of the interaction between technology, personal consumption and the construction of identity in the virtual space is a growing area of research. Users of digital technologies have a wide scope for constructing their virtual identity. The mostly nameless and faceless environments of cyberspace create an ideal background for developing alternate identities or digital personae. At the same time, there is an alarming increase in the amount and quality of data generated, collected and stored in the digital world. The sheer amount of this data is alarming, but so too is its nature, which is ever more detailed and personal. The public and private spheres of existence are experiencing a progressive blurring of the boundary separating them. These developments create a new set of concerns relating

to human identity, data privacy and protection.

The notion of identity, both offline and online, is complex. It incorporates not only philosophical considerations but also legal and practical ones. Identity is what makes individuals the same today as they were yesterday (sameness), but it is also what makes them different from one another (uniqueness). Underlying identity is the distinction between the private and the public spheres of human existence, and as such, identity and privacy are forcibly linked. In practical terms, identity can include parameters such as a social security number, a date of birth, a job title, a bank account or a credit card number. Digital identity refers to the online representation of a user's identity, and the identity of those the user is in interaction with (e.g. machines, institutions, other users, etc.). More specifically, it refers to the set of claims about a user or another subject made in a digital environment (e.g. internet exchange or mobile transaction).

Challenges for identity management in today's digital world arise from,



inter alia, the growing fragmentation of identity (e.g. the use of false identities), the lack of limits on the collection of identity parameters online, and unclear guidelines for the retention of data. There have been calls for digital identity management to be based on the use of partial identities (or pseudonyms) depending on context and user choice. Discussions regarding the principles upon which digital identity management systems should be predicated are ongoing both nationally and internationally. Not only are security experts evaluating the need for a coherent identity scheme that would stimulate online interactions

while protecting data and alleviating privacy concerns, but so too are lawyers, corporate strategists, and economists. Governments are also taking a greater interest in this area, particularly in an effort to thwart illicit activities and identity theft.

Though the importance of digital identity mechanisms is finally being recognized, much work remains to be done. Information regarding individual identities is becoming an increasingly valuable commodity, and as a consequence, its protection and management are vital to a healthy and inclusive digital world.

chapter five

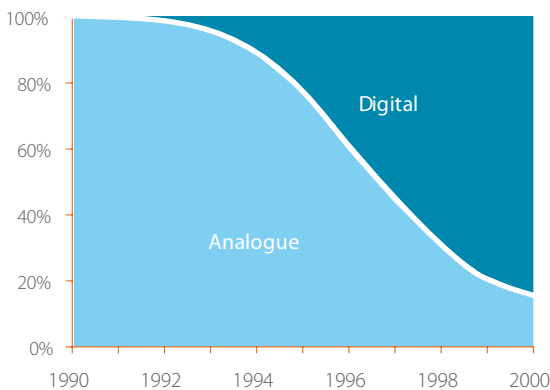
living the digital world

The telecommunications industry began as a digital-only world. The dots and dashes of the electronic telegraph that “made the world one”, in Arthur C. Clarke’s famous phrase, were not only digital in nature; they were also generated by the “digits” of an army of telegraph operators around the world. Between the invention of the telephone, in 1876, and the development of the first digital switch, exactly 100 years later, the

telecommunications industry took an analogue detour. But rapid innovation over the last few decades indicates that the digital world is firmly back on track. And although the transition from the analogue to the digital world is not yet complete, the direction of change is clear and irreversible.

A digital world poses a number of important challenges. For instance, the

Mobile cellular subscribers worldwide, in %



Source: ITU Information Society Statistics Database and IDATE.

increasing complexity of technology should not be at the expense of basic simplicity of use. The development of user-friendly systems must be encouraged, in order to ensure that a maximum number of people can use digital technology with a minimum amount of training. Only then can we be sure that the process of going digital is both inclusive and global and that the transition between the old and the new is smooth and rapid.

Another important challenge to the digital world is ensuring regulatory consistency, particularly in an environment of rapid technological change. This includes considerations related to technological neutrality, market definitions, regulatory timing and regulatory forbearance. The borderless spaces of the digital world also raise concerns about content, in particular the kind of “frontiers” we may wish to maintain in order to mirror, or reinforce, known frontiers in the offline (physical) world. Convergence (as reflected in services like mobile and internet TV) is bringing together three different regulatory cultures: the content-regulated culture of the broadcasting sector, the carrier-led culture of telecommunications, and the “regulation is interference” culture of the internet. Needless to say, it is

a potentially explosive mix. A final challenge is to extend the benefits of digital lifestyles to all the world’s inhabitants: by enabling everyone, everywhere, not only to access and utilize information and knowledge, but also to create and share it.

In order to gain a glimpse of how digital lifestyles might continue to evolve, an example of a typical “digital day”, at some unspecified time in the future, is illustrated overleaf. Ultimately, the digital world is a user-driven one in which consumers who are not happy with a particular service provider or website can easily switch to another. It is a footloose world, with a very low cost of switching for users and a relatively low cost of entry for service providers. It is a world in which traditional barriers to communication, like geography, language and social class, disintegrate. What is more, users can also participate in creating their own services and content. In the physical world, the height of most people’s ambition is to find proper employment, develop a hobby, purchase a home of one’s own, decorate it to reflect a chosen lifestyle, and fill it with their friends and family. We can now do this in the digital world too. So perhaps digital dreams are not so different, after all.

digital days, digital daze

Sensing the increasing intensity of the sunlight, Kim's curtains open, and the bedroom radio switches itself on. He awakes and taps the screen next to his bed, activating his house assistant—K-152, a humanoid robot. In his morning daze, Kim selects his breakfast from the images on the screen, and goes for a shower. In the kitchen, K-152 opens the refrigerator and puts the breakfast packet into the microwave oven. The RFID tag on the wrapping tells the oven how long to heat the contents. K-152 has been "learning" to make the coffee that Kim prefers. After a series of failed attempts, it is gradually mastering it. It is also learning to "cook" by downloading recipes online, which contain instructions for robots to make hot meals, based on the ingredients available in the refrigerator.

While showering, Kim watches the news projected onto the shower wall. While brushing his teeth, Kim stands on the scale and places his ring finger in a health check-up device. From the initial scan, Kim feels fit and healthy, but the scale disagrees and his weight is displayed in accusing red numbers on the mirror: 5kg overweight. He jumps off the scale quickly, but at the back of his mind he is aware that he has pre-programmed the scale to inform the refrigerator. It's a decision that he took jointly with his girlfriend who is also on a diet. As a result, chocolate bars and candy will not be replenished until Kim's weight reduces.

He will have to find a grocery store in the street, and that's becoming increasingly difficult as most people do their grocery shopping online.

Kim enters the kitchen and his breakfast is already on the table,



steaming hot. K-152 greets him in Mandarin, as programmed. By downloading interactive audio files from the internet, K-152 can practice conversations in several languages with Kim every morning. After some basic phrases, Kim sips the coffee and almost spits it out. There is no sugar in it. Apparently, K-152 has also been informed about the extra 5kg. While Kim tries to enjoy the rest of his breakfast, his dog Fabo runs into the kitchen. It wags its tail and begs for food but Kim ignores it, knowing that the dog food dispenser can take care of that. Nevertheless, Fabo is very entertaining and Kim quickly shoots a video clip of him, to upload later to *Vids4me*. His videos are already attracting a large number of downloads.

At 9:00am, Kim heads to his study to start work, but first he uses his mobile device to check on Maiko and Ade, his virtual world friends, who are spending all their money at the virtual mall. Suddenly, Kim receives an alarm call from the house monitoring system. With two clicks on his keypad, the site of the alarm call is revealed: downstairs, Fabo has spilt his breakfast. K-152 does not have the functionality to sweep up small objects like dog food, so Kim sends the vacuum cleaner to clean up the mess, and orders the food dispenser to give another portion to Fabo.

Over his lunch of celery sticks and low-fat tofu, Kim signs in to *YourPlace* on the web in order to update his personal profile and to upload some short video clips for his close friends to view. He is something of an amateur film-maker and often modifies clips of existing films to make them funny or thought-provoking. Kim often submits them to the video website *Vids4me*, and the videos have received consistently high ratings from viewers. If only he could convert his film-making hobby into a new career ...

For more information and to order your copy of

digital.life

please visit

www.itu.int/digitallife

statistical highlights

mobile market data

Top 20 economies (ranked by total subscriber numbers) as at 31 December 2005

Total subscribers, number of mobile broadband subscribers, penetration rate and price of OECD mobile low-user basket in USD.

Economy	Total mobile cellular subs.(000s)	Of which, total mobile broadband subs. (000s)	Penetration (per 100 Inhabitants)	OECD low-user Basket (USD)
1. China	393'428.0	*	29.9	\$2.90
2. United States	201'650.0	4'360.4	67.6	\$5.21
3. Russia	120'000.0	*	83.6	\$5.96
4. Japan	94'745.0	17'792.6	74.0	\$20.51
5. India	90'000.0	*	8.16	\$2.39
6. Brazil	86'210.0	175.0	46.25	\$26.52
7. Germany	79'200.0	2'289.0	95.8	\$17.34
8. Italy	72'200.0	10'262.0	124.3	\$14.43
9. United Kingdom	61'091.0	4'536.8	102.2	\$14.02
10. France	48'058.4	1'583.0	79.4	\$30.00
11. Mexico	47'462.1	...	44.3	\$14.00
12. Indonesia	46'910.0	...	21.1	\$4.30
13. Turkey	43'609.0	*	59.6	\$12.57
14. Spain	41'328.9	939.0	96.8	\$22.14
15. Korea (Rep.)	38'342.3	12'530.9	79.4	\$14.18
16. South Africa	33'960.0	216.1	71.6	\$13.26
17. Philippines	32'810.0	*	39.5	\$5.29
18. Poland	29'166.4	12.9	75.7	\$7.76
19. Thailand	27'379.7	*	43.0	\$4.35
20. Taiwan, China	22'171.7	113.9	97.4	\$26.29
WORLD	2'168'434.0	60'249.1	33.5	\$12.77

Source: ITU Information Society Statistics Database

Note: * 3G not commercially available, as of 31 December 2005. / ... Data unavailable.

«Mobile broadband» is $\geq$ 256 kbit/s in one or both directions

statistical highlights

broadband market data

Top 20 economies (ranked by total subscriber numbers) as at 31 December 2005

Total fixed broadband subscribers, penetration rate, broadband as a percentage of all internet subscribers and price per 100 kbit/s in USD.

Economy	Total fixed broadband Subscribers (000s)	Penetration (per 100 Inhabitants)	As % of Internet subscribers	Price in USD per 100 kbit/s
1. United States	49'391.1	16.6	73.9	\$0.49
2. China	37'504.0	2.9	51.2	\$1.43
3. Japan	22'365.1	17.5	66.0	\$0.07
4. Korea (Rep.)	12'190.7	25.2	100.0	\$0.08
5. Germany	10'686.6	12.9	53.4	\$0.51
6. United Kingdom	9'539.9	16.0	63.1	\$0.63
7. France	9'465.6	15.6	75.3	\$0.36
8. Italy	6'820.0	11.7	38.5	\$0.30
9. Canada	6'706.7	20.8	90.1	\$1.01
10. Spain	4'994.3	11.7	90.0	\$4.84
11. Taiwan, China	4'602.2	20.1	61.2	\$0.18
12. Netherlands	4'100.0	25.2	58.6	\$0.14
13. Brazil	3'304.0	1.8	41.8	\$1.08
14. Mexico	2'304.5	2.2	58.0	\$6.25
15. Australia	2'102.9	10.4	35.2	\$3.45
16. Belgium	1'974.8	19.1	90.3	\$1.21
17. Sweden	1'838.0	20.3	55.8	\$0.23
18. Switzerland	1'725.4	23.1	71.6	\$1.58
19. Hong Kong, China	1'659.1	23.6	62.8	\$0.83
20. Turkey	1'589.8	2.2	70.6	\$10.52
WORLD	215'477.7	3.3	56.2	\$72.20

Note: «Broadband» is ≥ 256 kbit/s in one or both directions

ITU Internet Report 2006:

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Table of Contents

Foreword

Data notes

Glossary

List of acronyms and abbreviations

I. Chapter one: Going Digital

1.1 The importance of being digital

1.2 Digital, invisible and ubiquitous

1.3 Digital dilemmas, digital dexterity

1.4 About this report

II. Chapter two: lifestyles.digital

2.1 Digital enablers

2.2 Connected computing

2.3 Digital communications

2.4. Digital content

2.5 Digital transactions

III. Chapter three: business.digital

3.1 Deriving value

3.2 Delivering access

3.3 Defining policies

3.4 Drawing lessons

IV. Chapter four: identity.digital

- 4.1 The digital individual
- 4.2 Virtually private
- 4.3 Managing identity in a digital world

V. Chapter five: Living the digital world

- 5.1 Challenges to the digital world
- 5.2 Digital days, digital daze
- 5.3 Digital dreams

Annex: Information Society Statistics

- Introduction
- List of economies
- 1. Key indicators
- 2. Mobile subscribers
- 3. Mobile prices
- 4. Mobile broadband subscribers and networks
- 5. Internet usage
- 6. Fixed broadband subscribers
- 7. Broadband prices
- 8. Fixed and mobile broadband
- 9. Market growth
- 10. World map
- Technical notes

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