



# The European Mobile Manifesto

How mobile will help achieve key European Union objectives  
October 2009



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## Foreword

Europe has set itself stiff challenges to 2015. It will need investment to drive growth and employment. It needs innovation to deal with climate change, an aging population and digital exclusion. And it needs to exploit its scale by creating a cohesive single market.

Mobile technologies can help Europe deal with these challenges. The late 20<sup>th</sup> century saw key transformative developments in mobile and the internet; the 21<sup>st</sup> century is seeing the convergence of these two in the mobile internet. Adding rich applications and broadband capabilities to mobile's existing strengths of connectivity, ubiquity and personalisation, mobile holds significant potential to improve the lives of European citizens and the economic performance of the region.

Mobile is a big investor, and has kept investing through the current economic downturn. Mobile's expansion of its networks to provide broadband and rich application capabilities will act as a significant economic stimulus. Moreover, the global success of mobile is a unique European achievement and an area where Europe continues to lead.

Mobile is also an innovator. The new capabilities of mobile will continue to stimulate markets in applications, software and services – creating opportunities for agile SMEs to flourish and for European corporations to maintain their global edge.

And the rich applications and always-on nature of next generation mobile will make it a valuable enabling platform for pan-European eMoney and eCommerce, stimulating the growth of the single market.

Building on SCF Associates' observation that: "*ICT is inextricably linked with our desire for a prosperous and competitive economy, a sustainable environment, and a more democratic, open, healthy society*"<sup>1</sup>, this report identifies how mobile will help to create a more prosperous, green and inclusive Europe for all.



**Rob Conway**  
CEO and Board member, GSMA

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<sup>1</sup> A Green Knowledge Society: An ICT Policy Agenda to 2015 for Europe's Future Knowledge Society, Sep 2009, SCF Associates Ltd

## Chapter 1

### Executive summary

#### EU policy themes – economic prosperity, social inclusion and eco-efficiency

Multiple macro themes recur in European Commission communications – economic prosperity, social inclusion and eco-efficiency. The Swedish Presidency has identified that ICT must play a vital role in addressing these issues:

- The knowledge economy: driver of future wealth
- The knowledge society: participation for all
- Green ICT: support for an eco-efficient economy
- Next generation infrastructure: balancing investment with competition
- Soft infrastructure: investing in social capital (eHealth and eEducation)
- SMEs and ICT: supporting Europe's small firms
- A single information market: enabling cohesion and growth
- Revolutionizing eGovernment: rethinking delivery of public services
- Online trust: a safe and secure digital world
- Clear leadership: rethinking the EU's policy making process

#### Europe can leverage its existing strength in mobile to help achieve these goals

The mobile sector's size demonstrates its importance to the European economy. The sector represents 1.3%<sup>2</sup> of EU Gross Value Added<sup>3</sup>, 1.2% of EU GDP, and employs over 600,000 people<sup>4</sup>. Within EU telecoms, mobile revenues now account for around 61%, up from 47% in 2002<sup>5</sup>. The sector continues to invest in its next generation infrastructure – a strong economic stimulus. Current estimates suggest that the mobile industry in Europe will deploy ~€145bn in capital expenditure to 2013, creating direct and indirect employment for over 4.7 million people<sup>6</sup>. Mobile is expected to make a significant contribution to recovery from the current downturn and to Europe's longer term fulfilment of the Lisbon objectives<sup>7</sup>.

Mobile is an area of European *global* leadership. Europe is a creator and driver of the harmonisation of global mobile standards – from GSM to common handset chargers. Europe is also home to the leading players across mobile services and equipment, with exports worth more than three times the exports of Korea or the US<sup>8</sup>. Further, Europe is a mobile business model innovator – in network outsourcing and network sharing – creating significant efficiency in the sector. And Europe is a product innovator – Nokia, Alcatel and Ericsson are 3<sup>rd</sup>, 5<sup>th</sup> and 9<sup>th</sup> respectively worldwide for telecoms patent innovation<sup>9</sup>. Through continued innovation, Europe can retain this leadership – and export its expertise as part of the knowledge economy.

Mobile is also central to European consumers' lives. It is the most ubiquitous, connected, personalised communications platform in Europe, surpassing 121% penetration in 2008<sup>10</sup>. Of EU households, 83% have access to at least one mobile phone, whereas only 49%<sup>11</sup> have PC-based broadband, and 24% are 'mobile-only', with no access to fixed line<sup>12</sup>.

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<sup>2</sup> The Changing Economic Impact of Telecommunications Sector in the EU, 2008, CEBR and European Central Bank Statistical Database. Note: includes mobile's direct GVA plus mobile's share of telecoms distributors, suppliers and externalities (second order impacts on other industries); mobile's share is calculated as a percentage of total telecoms (mobile, fixed and broadband).

<sup>3</sup> Note: GVA is a measure of the value of goods and services produced by a sector. GVA + taxes on products – subsidies on products = GDP

<sup>4</sup> The Changing Economic Impact of Telecommunications Sector in the EU, 2008, CEBR

<sup>5</sup> The International Communications Market 2008 – Telecoms, 2008, Ofcom

<sup>6</sup> European Mobile Capex & Employment Impact, Sep 2009, GSMA & AT Kearney. Note: includes 0.352m direct and 4.4m indirect employment gains

<sup>7</sup> Europa Glossary ([http://europa.eu/scadplus/glossary/lisbon\\_strategy\\_en.htm](http://europa.eu/scadplus/glossary/lisbon_strategy_en.htm))

<sup>8</sup> Communications Outlook 2009, OECD

<sup>9</sup> The Patent Board (<http://www.patentboard.com/home/index.asp?c=17>)

<sup>10</sup> Note: dual SIM card ownership in many markets explains why the number is >100%

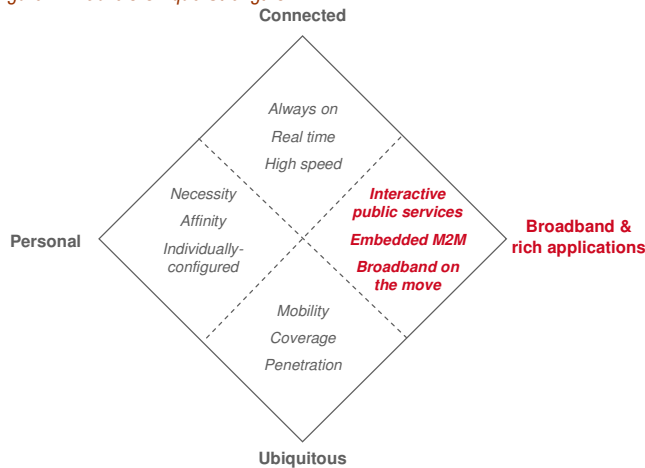
<sup>11</sup> Note: it is important to note however, that many people have access to broadband at work and do not choose to also have access at home – so it terms of personal access, the penetration of broadband is higher than 49%.

<sup>12</sup> GSMA Polish Focus Group, Aug 2009

## Mobile is evolving in ways that expand its potential

The late 20<sup>th</sup> century saw key transformative developments in mobile and the internet. The 21<sup>st</sup> century is seeing the convergence of these two in the mobile internet. Whereas historically mobile has been primarily a voice and narrowband-data service, it is developing into a platform for broadband and rich applications. Adding this functionality to its existing ubiquity, connectivity and personalization (see *Figure 1*), mobile has huge potential to enhance the lives of consumers, increase economic productivity and support eco-efficiency.

Figure 1: Mobile's Unique Strengths



Source: GSMA

Mobile's value to consumers is summed up by a quotation from our research: "My mobile is like my hand; I can't live without my hand"<sup>13</sup>. Mobile broadband is being used for on-the-move internet access and services such as banking, payments, eBay-auctioning, ticket booking, location-based apps, social networking and much more.

As well as its tangible enhancement of consumers' lives, mobile broadband is a significant driver of economic productivity. The mobile internet is revolutionising our knowledge economy by connecting computers with dongles, and smart phones delivering mobile email, real time navigation, maps, news updates and much more.

Mobile is also becoming a critical enabler of eco-efficiency. Mobile enabled machine-to-machine technologies are already allowing: the roll-out of smart grids which reduce the need for excess capacity so that generators can route power more efficiently, smart buildings which optimise energy use for air conditioning, heating and lighting using real-time presence data, and traffic management systems to maintain flow thus reducing jams and emissions.

And mobile is a key area of innovation in the delivery of healthcare and education. Research and development is ongoing in areas such as telemonitoring of the chronically ill to adjust treatment real-time and drive efficiency in healthcare<sup>14</sup>, as well as mobile-delivered educational support in higher education to improve retention and results<sup>15</sup>.

Since i2010 was first conceived, the mobile industry has played a key role in enabling these applications, and has delivered enormous value for the economy, society and the environment. The industry has made leaps and bounds in 'reasonable' network management to allow high quality delivery of these services and the management of dynamic traffic patterns within the confines of limited network and spectrum resources. These advances in network management ensure that not just voice, but an ever increasing portfolio of data services can be provided across mobile networks; it spurs innovation and new possibilities for future services.

The value the mobile industry has created could have been further enhanced by a lighter-touch approach to regulation which could have improved the ability of mobile operators to invest in network expansion and upgrades. However, despite the fact that the mobile industry is very dynamic and competitive, characterised by short life cycles and new and innovative products and services, regulatory intervention has led to a premature stagnation. This is the case although mobile data and mobile internet services have seen significant growth and acceptance by customers. Mobile revenue growth is thus "decelerating" according to the EC due to "increasing competition and falling retail prices, coupled with

<sup>13</sup> Ingenious Consulting focus group, Aug 2009

<sup>14</sup> Embedded Mobile: M2M Solutions and Beyond, Nov 2008, GSMA. Note: the addressable market for "Overweight Adults", "Chronic Disease Patients" and "Elders over the Age of 60" are 1bn, 860m and 600 units respectively out of a total addressable market size of ~3,600m units

<sup>15</sup> The Impact of Mobile Learning, 2009, LSN

*saturation in most countries and falling termination rates*<sup>16</sup>. While prices for other European goods and services rose between 2002 and 2007, mobile competition and regulation led to declines of 40%<sup>17</sup>. The EC, in its impact assessment on the MTR Recommendation from November 2008, estimated that mobile termination rate regulation alone might have a negative impact on mobile operators' cash flows/ profits of €26 billion from 2007 to 2012<sup>18</sup>, in addition to the €30 billion negative cash flow impact of existing regulatory intervention. And this was only a static perspective not including the expected negative impact on retail revenues.

It is perhaps related that a study by the GSMA and AT Kearney found that mobile investments have declined from 13% of revenues in 2005 to 11% of revenues in 2007.

### Mobile industry commitments and policy asks

This document focuses exclusively on the role mobile can play in achieving the ICT policy objectives of the EU. In some cases we recognise that mobile is only part of the solution, alongside other ICTs, but in some cases it delivers functionality or services that other technology cannot.

### 2015 Mobile Manifesto

The mobile industry will:

- **Increase internet connectivity and drive productivity** through widespread mobile broadband access – on the move and at home, in cities and in rural areas
- **Engage consumers and improve efficiency** by enabling the “mobilisation” of commercial and public services particularly eCommerce, eLearning, eHealth and eGovernment
- **Build a greener planet** by reducing Europe’s carbon footprint through mobile M2M technologies
- **Empower users and maintain consumer trust** by providing mobile privacy tools

This could generate approximately **€60bn to €120bn in value annually to 2015** – equivalent to 0.5% to 1.0% of GDP – or €340-750 in aggregate between 2010 and 2015.

To do this, the industry needs:

- **More spectrum** – develop a harmonised roadmap for release
- **Roll-out support** – remove barriers to eco-efficient coverage expansion
- **Demand stimulation** – be pro-mobile in public services, utilities and infrastructure
- **Consumer education** – promote user responsibility for online data and security
- **Network management** – continued flexibility to preserve choice and quality of service

### This report...

- Highlights Europe’s existing strength in mobile
- Explains the mobile industry’s 2015 Manifesto
- Estimates the economic, social and environmental benefits of these Manifesto commitments
- Outlines the policy asks to facilitate this Manifesto

<sup>16</sup> See EU Commission, COMMISSION STAFF WORKING DOCUMENT, Brussels, 7.5.2009, SEC(2009) 599, page 17 accompanying the COMMISSION RECOMMENDATION on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU, Implications for Industry, Competition and Consumers, C(2009) 3359 final.

<sup>17</sup> GSMA, On the Impact Assessment accompanying the Proposal for a Regulation of the European Parliament and of The Council amending Regulation (EC) No 717/2007 on roaming on public mobile phone networks within the Community and Directive 2002/21/EC on a common regulatory framework for electronic communications networks and services, October 2008

<sup>18</sup> See EU Commission, COMMISSION STAFF WORKING DOCUMENT, Brussels, 7.5.2009, SEC(2009) 599, page 56 accompanying the COMMISSION RECOMMENDATION on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU, Implications for Industry, Competition and Consumers, C(2009) 3359 final.

## Chapter 2

### Europe's existing strength in mobile

#### Global leadership

##### Europe creates and drives global mobile standards

European mobile is at the forefront of creating and promoting global industry standards. Europe was the creator and driver of the GSM standard which now provides mobile connectivity to consumers in 218 countries and covers 80% of the world's population<sup>19</sup>.

Europe is also leading the drive for common handset chargers – to reduce waste and improve energy efficiency. Ten leading global handset and chip manufacturers, led by European players, have now agreed to create a standard charger by 2010 and a universal charger by 2012<sup>20</sup>.

Europe continues to lead on Long Term Evolution (LTE<sup>21</sup>): "With LTE technologies, Europe's research 'know-how' will continue to set the tone for the development of mobile services and devices around the globe, just as we did in the past decades with the GSM standard.... [LTE] will create tremendous opportunities and plenty of space for growing the digital economy."<sup>22</sup> (Viviane Reding)

##### Europe's mobile companies are industry leaders

Europe's mobile companies are global industry leaders. Europe is home to five of the top ten global telecommunications services firms by revenue – Deutsche Telekom, Telefonica SA, France Telecom, Vodafone and Telecom Italia<sup>23</sup> (see Figure 2).

In terms of equipment manufacturing, European firms Nokia, Ericsson and Alcatel-Lucent represent the 1<sup>st</sup>, 4<sup>th</sup> and 5<sup>th</sup> largest communications equipment and systems firms in the world<sup>24</sup>. Nokia had 38.6% of the handset market in 2008<sup>25</sup>. Taking the EU27 in aggregate, European exports of telecoms equipment are worth more than three times the exports of Korea or the US (at €69bn for 21 of the EU27 countries vs. €22bn for Korea and €19bn for the US<sup>26</sup>).

Many European governments have explicitly decided to specialize in mobile, recognising the positive benefits that accrue. Finland and Hungary for example have provided public investment, and promoted private investment, within the mobile industry (see box outs). According to the Lafay Index (which measures a country's comparative advantage in particular sectors – in this case telecommunications) Finland, Hungary and Sweden are 1<sup>st</sup>, 3<sup>rd</sup> and 4<sup>th</sup> amongst the OECD countries<sup>27</sup>.

#### Case Study: Finland

*Finland's telecoms equipment exports account for 13.9% of its total exports – the highest level in the OECD. Public policies and liberalisation played an important role in the early stages of the mobile industry's development there. Finland has maintained high levels of public and private investment in R&D in the sector, allowing industry giants such as Nokia to rise to the fore.*

<sup>19</sup> GSMA (<http://www.gsmworld.com/technology/gsm/index.htm>)

<sup>20</sup> Mobile Phone Giants to Make European One-Size-Fits-All Charger from 2010, Jun 2009, Times Online

<sup>21</sup> Note: 4<sup>th</sup> generation mobile network technology to increase speed and capacity

<sup>22</sup> EU Invests a Fresh €18m in Future Ultra High-Speed Mobile Internet, 18 Aug 2009, European Commission Press Release

<sup>23</sup> Information Technology Outlook 2008, OECD

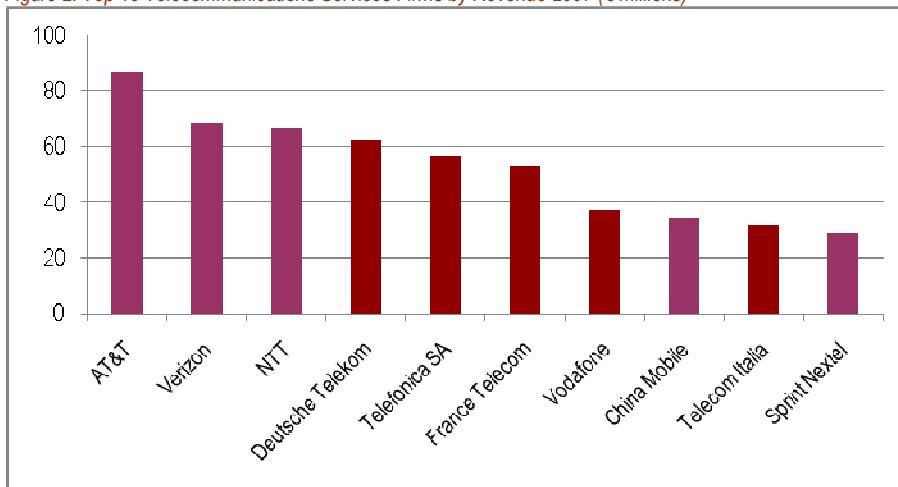
<sup>24</sup> Information Technology Outlook 2008, OECD

<sup>25</sup> Communications Outlook 2009, OECD

<sup>26</sup> Communications Outlook 2009, OECD. Note: translated using the same exchange rate of USD/ EUR: 0.73 utilized by the OECD for 2007

<sup>27</sup> Nokia Dominates World Cell Phone Market Share; Apple and RIM Competition Heightened, Jan 2009, Mobile Burn

Figure 2: Top 10 Telecommunications Services Firms by Revenue 2007 (€ millions)



Source: Information Technology Outlook 2008, OECD. Note: translated using the same exchange rate of USD/ EUR: 0.73 utilized by the OECD for 2007

## Europe is a mobile business model innovator – in network outsourcing and network sharing

Europe's equipment manufacturers have created a new model for operators by developing full-service, outsourced network management. European companies, Nokia Siemens Networks, Ericsson and Alcatel-Lucent are the leading global players. Indeed, Ericsson and Nokia Siemens are now the largest network operators in the world, serving over 350m end-users. In the UK, for example, all of the operators have outsourced their network management – Ericsson now manages 3, T-Mobile, O2 and Vodafone's networks whilst Orange's UK network is run by Nokia Siemens<sup>28</sup>.

Europe's network outsourcing has created efficiency savings for some operators<sup>29</sup> and has attracted attention from those outside of Europe. For example, Ericsson recently signed a multi-year outsourcing contract worth €1.4bn with Sprint Nextel in the US<sup>30</sup>.

Europe's operators are also at the forefront of active network sharing initiatives. (Active network sharing is when operators share electronic equipment within the cell site rather than just physical infrastructure such as the mast itself or the land on which it is located). India has long-standing passive mast sharing deals<sup>31</sup>, but Europe is the front runner in active sharing. High profile European network sharing deals have been struck by T-Mobile and 3 in the UK, Tele2 and TeliaSonera in Sweden, and Vodafone and TIM in Italy<sup>32</sup>. Network sharing by these operators has allowed them to reduce duplication and to increase population coverage.

### Case Study: Hungary

*Hungary has recently begun to specialise in the telecoms equipment area and has become a major outsourcing destination for many European ICT businesses. Having attracted skilled ICT professionals, the country is now seeing the rise of its own SMEs which are moving up the value chain from assembly to R&D.*

## Europe is a leader in product innovation

European mobile equipment manufacturers – led by industry giants Nokia, Ericsson and Alcatel-Lucent – invest substantially in R&D to maintain their strength in this increasingly competitive field. Nokia, Alcatel and Ericsson are 3<sup>rd</sup>, 5<sup>th</sup> and 9<sup>th</sup> respectively worldwide for patent innovation, according to The Patent Board's Telecoms Scorecard 2008<sup>33</sup> (see Figure 3 below), which ranks corporate innovation using metrics including patent quality, technological strength and breadth of impact.

<sup>28</sup> Ericsson and Nokia Siemens Are Managing Just Fine, Apr 2009, NYT

<sup>29</sup> Ericsson and Nokia Siemens Are Managing Just Fine, Apr 2009, NYT

<sup>30</sup> Sprint, Ericsson Sign US\$2bn Outsourcing Deal, Mar 2009, Fierce Wireless: translated using an exchange rate of USD/ EUR: 0.70

<sup>31</sup> Active Radio Access Network (RAN) Sharing Amounts to \$60bn Cost Saving Potential for Operators, 2 April 2009, ABI Research

<sup>32</sup> Case for Network Sharing Gets Stronger, Jan 2009, Telecoms.com

<sup>33</sup> The Patent Board: (<http://www.patentboard.com/home/index.asp?c=17>)

Figure 3: Patent Board's Telecoms Scorecard 2008

Rank	Company
1	Cisco Systems
2	AT&T Inc
3	<b>Nokia Group</b>
4	Motorola Inc
5	<b>Alcatel-Lucent</b>
6	Qualcomm Inc
7	Samsung Group
8	Nortel Networks Group
9	<b>Ericsson</b>
10	Research in Motion Ltd

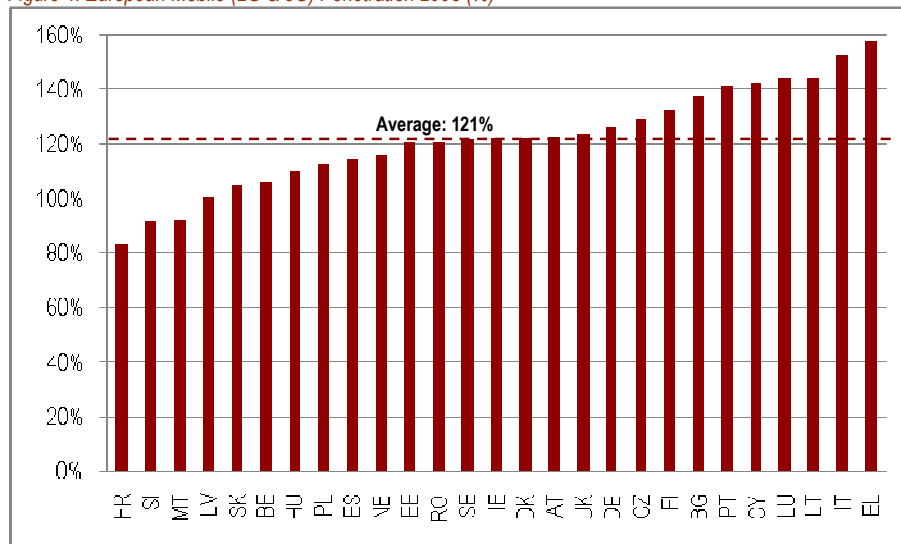
Source: The Patent Board. Note: European companies are in red: Nokia Group, Alcatel-Lucent and Ericsson; the other companies are based in the United States, South Korea and Canada

## Consumer ubiquity

### Mobile is the most ubiquitous communications platform in Europe – exceeding fixed line and PCs

Mobile is the most highly penetrated communications platform across the EU. Penetration now exceeds 121%<sup>34</sup> (see Figure 4) and 83% of EU households have access to at least one mobile<sup>35</sup>; only 49%<sup>36</sup> have PC-based broadband access. Indeed the Gini Coefficient (a measure of inequality of access) was twice as high for PCs as for mobiles in 2007<sup>37</sup>.

Figure 4: European Mobile (2G & 3G) Penetration 2008 (%)



Source: Wireless Intelligence 03 Aug 2009

The number of EU households relying solely on mobile, with no fixed line at all, rose from 18% in 2005 to 24% in 2007 (see the figure below). This is occurring not just in countries where mobile is leapfrogging fixed line services but also in

<sup>34</sup> Wireless Intelligence 03 Aug 2009. Note: mobile penetration rate is for 2008

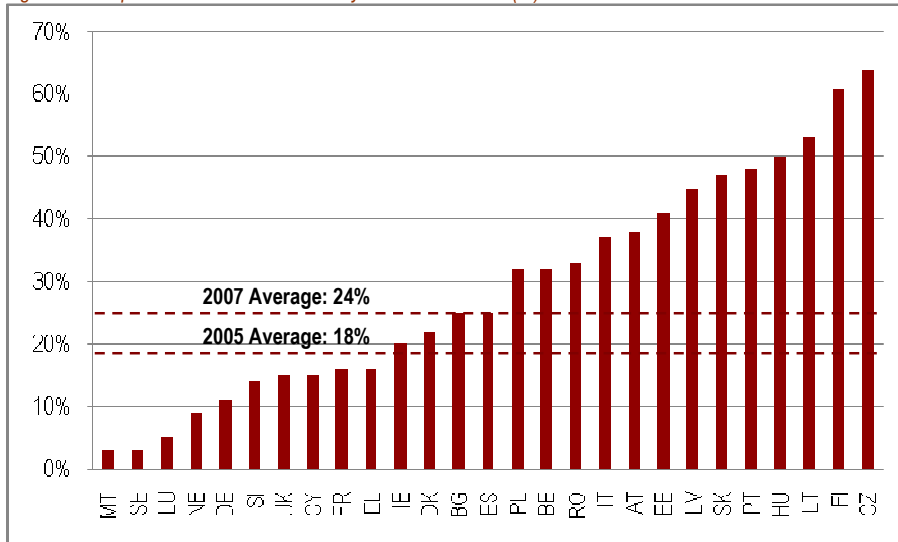
<sup>35</sup> Eurobarometer Special Survey: E-Communications Household Survey 2008, European Commission

<sup>36</sup> Note: it is important to note however, that many people have access to broadband at work and do not choose to also have access at home – so it terms of personal access, the penetration of broadband is higher than 49%.

<sup>37</sup> Information Technology Outlook 2008, OECD; Note: Gini Coefficient was c. 7.5% for mobiles, c. 15% for PCs and c. 18% for the Internet

mature markets where consumers are simply deciding that mobile alone is the preferred platform for meeting their communications needs.

Figure 5: European Household Mobile-Only Penetration 2007 (%)



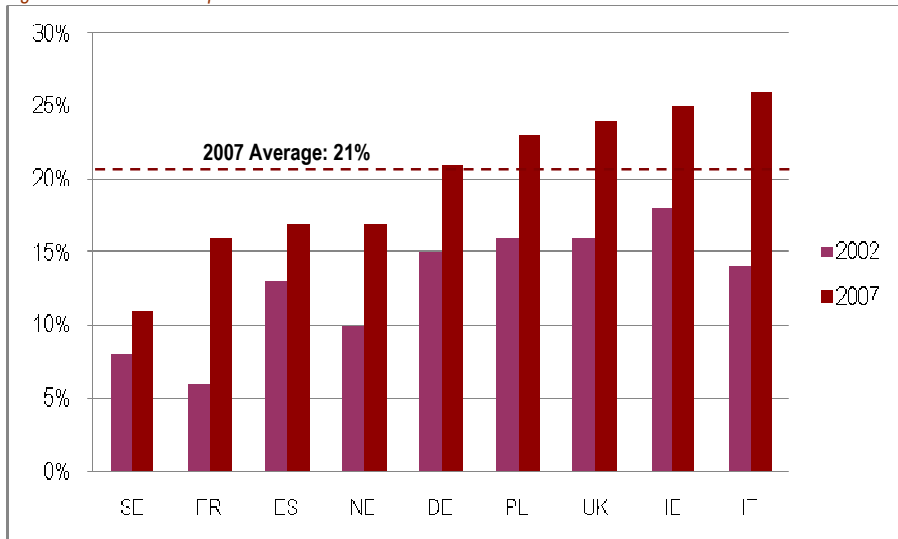
Source: Eurobarometer Special Survey: E-Communications Household Survey 2006 & 2008, European Commission<sup>38</sup>

### Consumers and business users are increasingly turning to mobile for data services

The rise of unlimited data tariffs, 3G smart phones such as the iPhone, and PC dongles means consumers and business users are increasingly using mobile networks for data access. Data accounted for 21% of operator revenues in 2007, up from 13% in 2002 (see

Figure 6), with non-SMS data accounting for 27% of that total, up from 12% in 2002 (see Figure 7). The number of active users of data services is thought to have more than doubled in the last twelve months, from 7% to 16% (see Figure 8).

Figure 6: Data as % of Operator Mobile Revenues

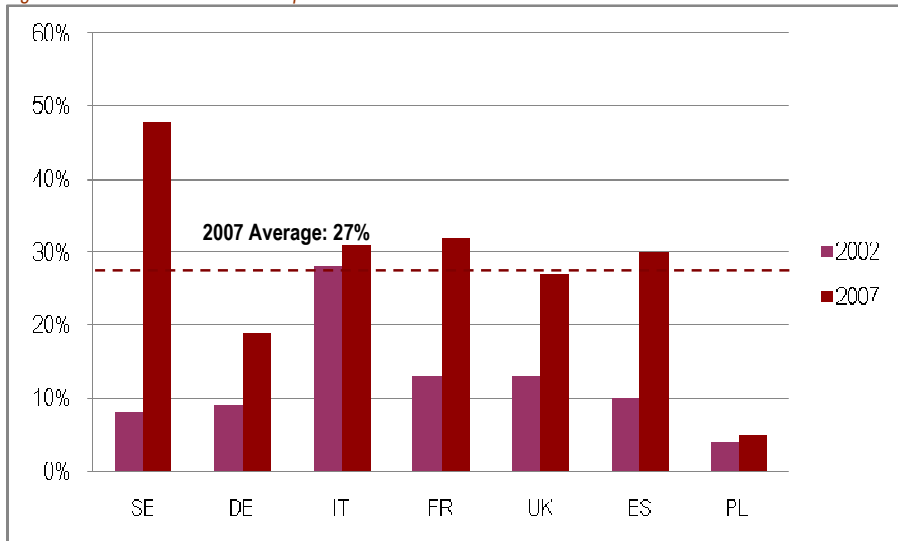


Source: The International Communications Market 2008 – Telecoms, Ofcom<sup>39</sup>

<sup>38</sup> Note: household mobile-only penetration is defined as the percentage of households with only mobile phone access and no fixed-line access

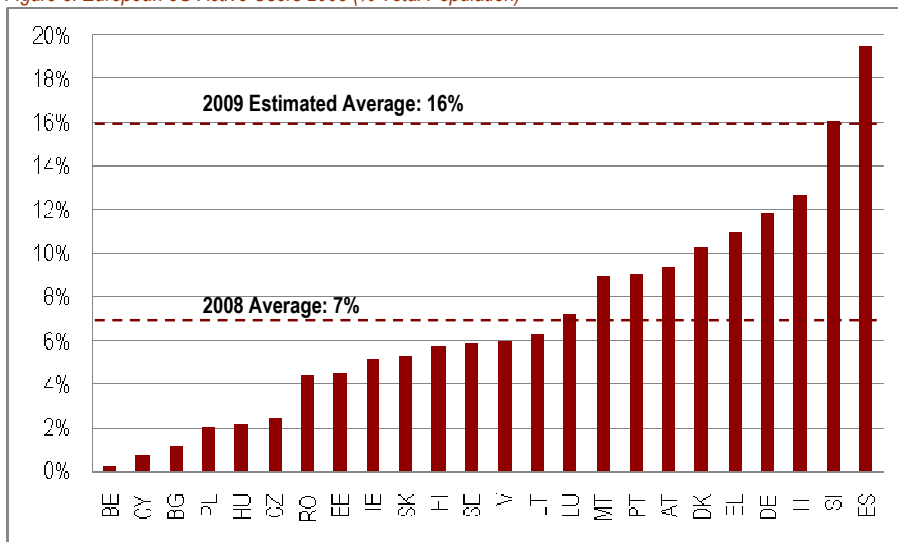
<sup>39</sup> Note: operator mobile revenues refer to revenues earned from the provision of mobile voice and data services by either fixed-line and mobile providers or mobile-only providers

Figure 7: Non-SMS Data as % of Operator Mobile Data Revenues



Source: *The International Communications Market 2008 – Telecoms, Ofcom*<sup>40</sup>

Figure 8: European 3G Active Users 2008 (% Total Population)



Source: *European Commission Communications Committee Working Document*<sup>41</sup>

<sup>40</sup> Notes: Operator mobile data revenues refer to revenues earned from the provision of mobile data services by fixed-line and mobile providers or mobile only providers; fixed-line broadband revenues are not included

<sup>41</sup> Broadband Access in Europe: Situation at 01 July 2008. Note: 3G (mobile broadband) usage is defined as active users accessing dedicated data services via data modems/ cards/ USB keys or where the user has accessed advanced data services such as web/ internet content/ online multiplayer game content/ video on demand or other equivalent data services (excluding SMS and MMS). No information was available for France, UK and the Netherlands. Estimate for 2009 is from EU says 'Digital Europe can only be built with content creators on board', Jul 2009, PublicTechnology.net

## Chapter 3

### 2015 Mobile Manifesto

#### Summary

The mobile industry will:

- **Increase internet connectivity and drive productivity** through widespread mobile broadband access – on the move and at home, in cities and in rural areas
- **Engage consumers and improve efficiency** by enabling the “mobilisation” of commercial and public services particularly eCommerce, eLearning, eHealth and eGovernment
- **Build a greener planet** by reducing Europe’s carbon footprint through mobile M2M technologies
- **Empower users and maintain consumer trust** by providing mobile privacy tools

#### **Increase internet connectivity and drive productivity through widespread mobile broadband access – on the move and at home, in cities and in rural areas**

Providing broadband for all is a focus for governments across the EU – to create a connected society and enhance productivity. According to the European Internet Foundation’s ‘Digital World’ report, Europe’s aim should be to get “everybody connected to broadband networks, allowing full participation in the digital world”<sup>42</sup>

Mobile can help to boost productivity in two key ways. First, mobile can provide broadband on the move. This allows the creation of a virtual office from anywhere, with significant impacts on productivity. Mobile broadband can provide email access, secure access to remote applications and access to the web via a laptop using a USB dongle. In Holland for example, 12% of the workforce ‘telecommuted’ at some point during 2008<sup>43</sup>.

Second, mobile can help to ‘fill in’ fixed line coverage gaps – LTE can complement fibre infrastructure – if spectrum in low bands like the Digital Dividend is available also in rural areas. With less physical infrastructure to install or maintain than a fixed network, mobile broadband can be more cost effective to roll out in rural areas<sup>44</sup>. Estimates put the capital cost of providing mobile coverage to an individual at about 1/10<sup>th</sup> of the cost of installing a fixed-line connection<sup>45</sup>.

*“I would always be able to use the internet, without having to look for hotspots. Plus if I have constant access to a fast connection, with the same speed upload and download speeds... this provides huge opportunities.”*

(Focus group)

Although fixed line broadband has greater capacity than mobile, the real benefits of broadband for consumers and businesses come with functional access at around 1-2Mbps which mobile can provide. This allows voice calls, audio streaming and web browsing, as well as basic virtual worlds and video conferencing, some Video on Demand (VOD)/Internet Protocol TV (IPTV) services and some online games. The only service which cannot be provided at this speed is HD TV.

To facilitate the provision of mobile broadband to the entire EU population the mobile industry will seek to:

- Collaborate with governments and fixed line operators to expand mobile broadband provision, in line with demand, with the aim of achieving ~98% population coverage at 1-2Mb
- Collaborate with fixed line providers regarding fixed NGA infrastructure to support mobile backhaul

<sup>42</sup> The Digital World in 2025, Sep 2009, European Internet Foundation

<sup>43</sup> Carbon Connections, Jul 2009, Accenture

<sup>44</sup> The Impact of Broadband on Jobs and the German Economy, 2009, Katz, Vaterlaus et al

<sup>45</sup> World Development Indicators, 2006, World Bank, from ‘3G in Emerging Markets’, Dec 2007, Qualcomm

## Engage consumers and improve efficiency by enabling the “mobilization” of commercial and public services particularly eCommerce, eLearning, eHealth and eGovernment

Alongside mobile’s utility as an access technology for the internet, it can also facilitate the provision of core public services such as education, health and government services, as well as internet-based commercial consumer services. Mobile’s ubiquity, connectedness and personalisation offer convenience for users and efficiency savings for providers.

### Mobile delivery of eCommerce

To remain globally competitive Europe must leverage its economies of scale and remove barriers to the growth of the single market. With over 622 million active connections in Europe<sup>46</sup>, each with an individual billing relationship with an operator, mobile is in a unique position to help create mechanisms to support this single market.

Mobile provides a platform for the extension of eCommerce businesses to cross-border, on-the-move applications, content and services. This crucially requires, however, agreement on common standards. These common standards (e.g. Application Programming Interfaces or APIs) should be accessible for any developer, operator or customer, from any handset. By increasing the addressable market in this way, Europe can invigorate its developer community and maintain its innovation leadership.

Mobile can also be a conduit for eMoney, which would facilitate cross-border travel (through ease and speed of ticketing) and commerce. Mobile eMoney can be used for remote transactions or at the point of sale using near field communications (NFC), with the purchases aggregated in the subscriber’s monthly bill or deducted from prepaid credit<sup>47</sup>. Mobile NFC offers advantages over conventional contactless cards:

1. Applications, interactivity and downloadability on mobile will help to provide richer, real-time cash and banking services to consumers on the move
2. Mobile offers small transaction costs resulting in no minimum payment requirements
3. Cards cost money to produce whereas eMoney functionality can be downloaded onto a SIM for much less – thus saving banks significant cost

Specifically the industry will:

- Continue to work with the GSMA on OneAPI – a set of standard open APIs for developers to use to access multiple operators
- Continue to work with national governments on mobile eMoney and develop a European standard

### Mobile delivery of eLearning

Mobile is in a unique position to support the delivery of education in three key ways.

*“I think that education [via mobile broadband] is very important because fast access to information and a change in teaching methods will be beneficial to the future of society.”*  
(Focus group)

First, mobile can help bridge the digital divide because mobile penetration is higher than PC penetration. Statistics from the UK indicate that mobile ownership nears 100% for those aged 13 and above<sup>48</sup>. And the Gini Coefficient (a measure of the inequality associated with access to various products) in 2007 was twice as high for PCs as for mobiles<sup>49</sup>.

Second, mobility adds value to formal and informal learning because every location can become an interactive ‘enhanced environment’. For example, in an art gallery a camera phone could be pointed at an exhibit to receive additional information about the artist. Mobility also allows teachers to provide continued support to those who are missing school due to illness or disability.

Third, mobile is personal and can therefore support the provision of learning that is tailored to the individual’s development needs.

By supporting learning in these ways, mobile can make education more efficient and more effective. Blended learning (a combination of e-learning and classroom based learning) is 20% cheaper than equivalent face-to-face teaching<sup>50</sup>. And mobile learning can increase retention by 8% and achievement by 9.7%<sup>51</sup>. Student feedback has been resoundingly positive: 91% thought mobile learning helped them to learn, 93% believed it made learning more interesting, and 84% wanted to do more mobile learning in future<sup>52</sup>.

<sup>46</sup> Wireless Intelligence 03 Aug 2009

<sup>47</sup> Note: multiple alternative systems exist. For a good summary see Security and Trust in Mobile Applications, Oct 2008, 3G America

<sup>48</sup> Mobile Life Youth Report 2006, London School of Economics

<sup>49</sup> Information Technology Outlook 2008, OECD: Gini Coefficient was c. 7.5% for mobiles, c. 15% for PCs and c. 18% for the Internet

<sup>50</sup> The Impact of Broadband on Growth and Productivity, 2008, MICUS

<sup>51</sup> The Impact of Mobile Learning, 2009, LSN

<sup>52</sup> The Impact of Mobile Learning, 2009, LSN

The mobile industry will seek to create a market for eLearning by:

- Working with governments and educational authorities to develop a set of common, open standards for mLearning platforms to stimulate development and uptake
- Collaborate on R&D initiatives to test new mLearning systems

## Mobile delivery of eHealth

The European healthcare system faces tough challenges. The aging population is driving increased demand for healthcare services, the incidence of chronic disease (and health risks such as obesity) is rising, and interventions are often late and therefore expensive. This is set against a backdrop of high patient expectations and stable or declining budgets.

Mobile can leverage its unique capabilities to address these challenges. It can support the delivery of healthcare through telemedicine for the chronically ill and sending reminders to patients to take medication or go to a doctor's appointment. It can also enable remote monitoring using machine-to-machine (M2M) technologies<sup>53</sup>. Mobile can also support the secure storage and transfer of medical data from anywhere to anywhere. Such mobile applications can improve the efficiency and efficacy of healthcare, freeing up space and staff time in hospitals to focus on the most serious cases.

*"I'm currently being treated for migraines and the doctor has asked me to keep a diary of when I get an attack and how severe it is. It would be good if I could track these attacks on a portable handset. Then the doctor could download the details of all my attacks at my next appointment".*

(Focus group)

Mobile will seek to:

- Work with the European Commission to put in place a long term strategy for mobile use in healthcare, to provide confidence around investment for national health authorities
- Work with governments to develop standards for the delivery of core healthcare services such as prescription provision to mobiles and appointment reminders

## Mobile delivery of eGovernment

Governments across Europe are seeking to "rebuild trust in Europe as an open and democratic society"<sup>54</sup>. Mobile can support this in four clear ways.

First, mobile provides a platform for the delivery of eGovernment services to those without PCs. Though demand for government services is universal, it is highest amongst disadvantaged groups who are more likely to be connected to mobile than to fixed line.

Second, mobile delivery of eGovernment services can increase efficiency in terms of consumption and delivery. Services and information can be accessed from anywhere, and mobile delivery is paperless, saving costs and reducing waste in delivery. The fact that mobile usage is significantly higher in the private sector than the public sector currently suggests that the potential gains (catching up and then taking the lead) are significant. By way of example, a study on mobile penetration in French workplaces found that penetration within public administrative services was lower than in most private sector industries including transport, construction, finance, health, agriculture, non-profit, retail and media<sup>55</sup>.

*"[Mobile broadband] would increase intervention by the public because involvement will be immediate. You would be able to inform the authorities quickly if you see something incorrect".*

(Focus group)

Third, mobile can help increase engagement and reach. It can create more instantaneous and open lines of communication between citizens and governments, particularly given mobile's high penetration in harder-to-reach groups. For example, governments could send mini questionnaires via mobile for instant feedback on public services.

Fourth, mobile is personal and, as such, allows the personalisation of service delivery. Whereas PCs are often shared between families, creating difficulties in ascertaining who is accessing the service, mobiles provide one-to-one communications channels. This personalisation and flexibility can increase user satisfaction.

To ensure that both government and mobile can achieve these benefits, the industry will:

- Work with governments to enable eGovernment services to be optimised for mobile
- Work with governments to develop mobile-based feedback systems for use in relation to public services
- Support research into how mobile can help engage voters in the democratic process

<sup>53</sup> Embedded Mobile: M2M Solutions and Beyond, Nov 2008, GSMA. Note: the addressable market for "Overweight Adults", "Chronic Disease Patients" and "Elders over the Age of 60" are 1bn, 860m and 600 units respectively out of a total addressable market size of ~3,600m units

<sup>54</sup> European Commission Consultation, Aug 2009, Ken Ducatel

<sup>55</sup> Module Mobiscope: Les Marches des Telecoms Mobiles, Jun 2008, Enov Research

## A note on managing the delivery of these services

Although networks have never been simple conduits, the proliferation of increasingly sophisticated mobile-public-services will even more strongly justify the need for mobile networks to move beyond “*faster, fatter pipes toward cleaner mobile pipes and smart networks*”<sup>56</sup>. To ensure that critical services, such as real-time eHealth monitoring, are delivered without interruption, and with the best possible experience for all users, mobile operators will need to manage network traffic.

## Build a greener mobile planet by reducing Europe’s carbon footprint through M2M technologies

*“By 2025, economic growth and competitiveness everywhere will depend on the presence of smart systems at the core of major economic and social sectors ... it will also prove a vital condition for managing climate change and its effects.”*<sup>57</sup>

(The Digital World in 2025, European Internet Foundation)

Smart systems will support smart green growth. Mobile networks provide the appropriate connectivity, transmission capabilities and security to help consumers and businesses more efficiently manage their energy consumption and reduce their carbon footprint.

The potential of M2M for consumers is broad – from monitoring home security whilst overseas to remotely turning off appliances and other devices left on in error. Howard Stringer, Chairman & CEO of Sony, estimates that: “90% of [Sony’s] device categories will be network enabled and wireless capable by FY2010.”<sup>58</sup> GSMA’s Embedded Mobile Report estimates an addressable market size for wireless enabled devices of 300 million home appliances, and 75 million motor vehicles<sup>59</sup>.

*“[With mobile broadband] people won’t have to go to the office, they will be able to stay and work from home .... You will reduce your carbon footprint because you needn’t move from your house.”*

(Focus group)

M2M also has a role to play in businesses:

- **Traffic management** systems can use real-time data to optimise signals to ensure constant flow and reduce emissions. A related development is telematics – from the real time tracking of fleets of vehicles to better manage drivers and fuel efficiency, to eCall<sup>60</sup> which will put SIMs in all new EU cars from 2012. One example of these technologies is the UK-based Isotrak’s fleet management system which combines satellite tracking and onboard telematics using SIM cards. The system has already saved Asda (a UK supermarket chain) 18 million road miles, representing 28,000 tonnes of CO<sub>2</sub> and a reduction in fuel costs of 23% over 3 years<sup>61</sup>.
- **Smart buildings** are another area where M2M is making waves, by using real-time presence data to optimise energy use for air conditioning, lighting and other building functions. The Solaire building in New York for example, has reduced its energy consumption in peak hours by 67% compared to buildings of equivalent size<sup>62</sup>.
- **Power grids**<sup>63</sup> present a huge M2M efficiency opportunity. Current centralized energy distribution networks are often huge, inefficient grids that lose power in transmission, require an overcapacity of generating capability to cope with unexpected surges in energy use and allow one-way communication only – from provider to customer. In most countries, selling energy back to the grid (e.g. that generated from solar panels) is impossible. M2M enables the installation of “smart grids” which are sets of software and hardware tools that enable generators to route power more efficiently, reducing the need for excess capacity and allowing two-way, real time information exchange with customers for real-time demand-side management. It improves efficiency, energy monitoring and data capture across the power generation and transmission and distribution network. With 253 million electricity meters and 109 million gas meters in the EU23+2, the opportunity for efficiency is significant<sup>64</sup>.
- **Smart cities** can significantly reduce energy use and carbon emissions. For example, in an effort to cut energy bills, residents in Dörentrup, 60 miles from Hanover, Germany have been given the ability to turn the village street lights on as and when they need them using the Dial4Light scheme. The trial has been so successful that the system will be rolled out to all 9,000 residents. To use the system, residents make a call, entering the code

<sup>56</sup> The Digital World in 2025, Sep 2009, European Internet Foundation

<sup>57</sup> The Digital World in 2025, Sep 2009, European Internet Foundation

<sup>58</sup> Embedded Mobile: M2M Solutions and Beyond, Nov 2008, GSMA

<sup>59</sup> Embedded Mobile: M2M Solutions and Beyond, Nov 2008, GSMA

<sup>60</sup> Note: a system whereby SIMs are embedded into cars to allow emergency calls to be made if an accident happens

<sup>61</sup> Carbon Connections, Jul 2009, Accenture

<sup>62</sup> Smart 2020, 2008, The Climate Group

<sup>63</sup> Note: smart grids can route power more efficiently and thus reduce the need for excess capacity, as well allowing the integration of renewables and distributed generation into national grids

<sup>64</sup> Smart Metering in Western Europe, Sep 2009, Berg Insight

number displayed on each lamp post and the light comes on within seconds. The light stays on for up to 15 minutes before automatically switching off. Data collected by the council shows that the Dial4Light will reduce the community's carbon dioxide emissions by almost 20 tonnes annually – equivalent to emissions from 11 four-person households<sup>65</sup>.

- **Radio-Frequency Identification (RFID) technologies** enabled by mobile broadband can significantly increase productivity in businesses. For example, RFID has applications in terms of supply chain management, ensuring product integrity, travel and ticketing. It can also improve eco-efficiency. In logistics for instance, RFID can facilitate recycling, improve waste disposal and encourage the reuse of packaging materials.

Using existing mobile networks offers multiple advantages over building new private networks. Mobile networks are standardised, meaning that M2M solutions will be future-proof and interoperable. This standardisation also avoids the complexity of customer-specific IT policies and firewalls at the WAN/LAN interface which can interfere with post-sale support services<sup>66</sup>. Mobile networks are also more cost efficient and reliable than building new private networks because they already exist and offer wide coverage.

Specifically mobile will seek to:

- Promote the potential for mobile network use in M2M solutions – particularly in those applications which require not just wireless connectivity but mobility such as fleet management.
- Support the eCall initiative and work with car manufacturers to roll out the system

As a result of mobile's new role as an enabler of energy efficiency, the industry will see significant growth in users and usage. The mobile industry will work to offset this increase through multiple commitments:

- Make cell sites more energy efficient – for example, by using fresh air to cool generators rather than air conditioning systems, using renewable energy to drive generators and challenging equipment vendors to develop more temperature resistant equipment
- Share sites and network infrastructure to reduce overall energy usage
- Standardise chargers to reduce the emissions from production, and to make these chargers more energy efficient
- Continue to focus on handset and network equipment recycling
- Deploy mobile broadband technologies at lower frequencies (where these are available) allowing wider coverage from fewer sites

### Empower users and maintain consumer trust by providing mobile privacy tools

*"Mobile communication is a great opportunity for the development of Europe's economies and societies. However, at the same time, the protection of minors needs to be guaranteed."*

*(Viviane Reding)*

Privacy and the protection of personal and business data online is a growing consumer, commercial and legal concern. These concerns are informed by malicious attempts to compromise services and applications by hacking and computer viruses; by identity theft, phishing and pharming<sup>67</sup>; by the theft or loss of data entrusted to business; and by perceived or actual loss or lack of consumer choice and control over the online use of their personal data. Online fraud alone is estimated to be worth more than €59 billion globally per year<sup>68</sup>. And virus attacks cost businesses over €10.4bn globally each year<sup>69</sup> in reactive costs and downtime (excluding preventative costs for security tools).

Privacy and security concerns are heightened by the challenge of applying geographically-bound laws to both the global internet infrastructure and 'global' services that cut across territorial borders. This is creating privacy expectations that are transboundary and which increasingly transcend the ability of national laws to protect consumers.

Privacy and security threats will only grow as the European internet society develops and becomes increasingly reliant on digital systems. The World Economic Forum estimated in 2008 that there is a 10 to 20% probability of a major critical infrastructure breakdown in the next ten years with a potential global economic cost of about \$250 billion (~€170 billion)<sup>70</sup>.

<sup>65</sup> German Village Pioneers Energy-Saving 'Dial-a-Light' Scheme, Jun 2009, UTV News

<sup>66</sup> Note: GSMA's Embedded Mobile report gives the example of a leased photocopier with in-built mobile capabilities to monitor copier performance and ink stock levels.

<sup>67</sup> Note: phishing refers to attempts to acquire sensitive information by masquerading as a trustworthy entity in electronic communications; pharming refer to attacks aimed at redirecting traffic to another bogus website

<sup>68</sup> A Green Knowledge Society, SCF Associates Ltd

<sup>69</sup> Financial Aspects of Network Security, 2008, International Telecommunications Union. Note: 2006 estimate translated using the same exchange rate of USD/ EUR: 0.80 utilized by the OECD for 2006 (the exchange rate used in the ITU report itself was not available)

<sup>70</sup> A Green Knowledge Society, SCF Associates Ltd

Although mobile is currently a reasonably secure environment, growing attempts to compromise services and applications increasingly threaten to limit the types of applications that are provided. To maintain choice and freedom for users, to enhance consumer confidence and trust, and to liberate users to freely engage with new social media and other technologies, the ICT industry needs to establish a participatory privacy and security framework. The industry needs to establish common standards and business practices, and provide consumers with real, meaningful choice and control over their data. It also needs to provide them with tools (such as digital signatures<sup>71</sup> or prompts regarding the certification of sites) and information to help them manage their own privacy, and that of their children – whether they are accessing the internet via wireless or fixed networks. ‘A Green Knowledge Society’ observes that a culture of shared responsibility is the only sustainable solution:

*”We must ensure respect of privacy and personal data more effectively, while creating trustworthy digital identities. We need a shared culture of responsibility for security with families, industry, government and others in the public and private sectors all playing their part to reduce the risks.”<sup>72</sup>*

Specifically mobile will:

- Engage with global stakeholders (device manufacturers, SIM manufacturers, operating system developers, application developers, vendors and online service providers) to establish common standards, business practices and tools to protect data privacy. These principles and tools should be considered in the design and build of all new hardware, software and applications
- Engage with these stakeholders on specific tools to allow parents to protect children online and on mobile
- Engage with ENISA to raise consumer awareness of the challenges of the always-on environment
- Collaborate with the Spanish Presidency to include mobile privacy aspects in the Declaration of User’s Rights

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<sup>71</sup> The GSMA Digital Signatures Initiative is an example of a consumer tool that can help counter fraud . The signatures will enable identification and authentication of individuals via their mobile phones. This secure identification system has many potential applications – from the authentication of personal identity for access to health records via mobile or the signing of secure transactions, to the authentication of goods (such as cargo being transported across borders) using a handheld device. In legal terms, signing using a digital signature can be equivalent to hand-signing, with the right mechanisms in place, allowing authentication in third party or remote transactions which previously required physical presence.

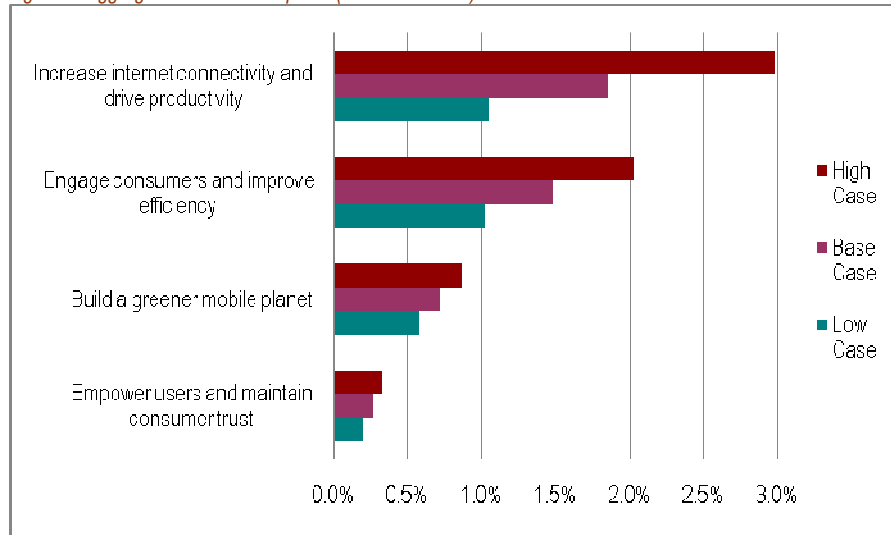
<sup>72</sup> A Green Knowledge Society, SCF Associates Ltd

## Chapter 4

### Impact assessment

Mobile, if allowed to develop as envisaged in this Manifesto, could add 0.5-1.0% to EU GDP annually to 2015 (2.8-6.1% in aggregate). This is worth around €340-750bn to the EU economy between 2010 and 2015<sup>73</sup>. The chart below shows how this impact is distributed across the four Manifesto areas, with mobile’s ability to ‘increase internet connectivity and drive productivity’ creating by far the largest incremental value.

Figure 9: Aggregate NPV of All Impacts (% of 2009 GDP)



Source: GSMA

To calculate these impacts we have calculated a Net Present Value (NPV) of the efficiency, productivity and incremental revenue impacts from 2010 to 2015<sup>74</sup>. Efficiency and productivity improvements are the largest contributors:

- Efficiency cost savings: aggregate impact to 2015 of ~€170-300bn, which equates to 1.4-2.4% of 2009 EU GDP
- Productivity improvements: aggregate impact to 2015 of ~€140-390bn, which equates to 1.2-3.2% of 2009 EU GDP
- Incremental revenue: aggregate impact to 2015 of ~€30-60bn, which equates to 0.2-0.5% of 2009 GDP

It is important to note that these estimates exclude multiple impacts that cannot be sensibly estimated – such as the impact of increased attainment in schools through mLearning support, or the impact of telemedicine on the health of the population and therefore labour force productivity. The figure below summarises all the impacts identified, with those we have been able to quantify highlighted in red. Taking this into account, even our high case can be seen as conservative.

For detail about our methodology, please refer to the end of this Chapter. *Please note that the total NPVs shown in the tables in this Chapter have been rounded up to the nearest billion and therefore the line items may not sum precisely to the totals stated.*

<sup>73</sup> Note: this is based on a high case estimate of €750bn over the next six years (equivalent to 6.1% of 2009 GDP, or ~1.0% per year, straight-lined). Even our conservative low case gives a total incremental impact of 0.5% per year, or €340bn to 2015 (2.8% of 2009 GDP, or 0.5% per year). Note: we use 2009 GDP as the benchmark given broad consensus on these figures (there is some variation between estimates for 2015 EU GDP depending on bullishness regarding recovery).

<sup>74</sup> Note: we have not used ‘in perpetuity’ values because these are by their very nature much larger, and because the Manifesto is focusing only on the potential of mobile to 2015

Figure 10: Summary of Impacts

	Economic	Environmental	Social
<b>1</b> Increase internet connectivity and drive productivity	<ul style="list-style-type: none"> <li>In-home coverage – productivity</li> <li>Out-of-home coverage – productivity</li> </ul>		<ul style="list-style-type: none"> <li>Connected society</li> <li>Informal learning &amp; knowledge share</li> <li>Creativity through UGC tools</li> <li>Social participation</li> </ul>
<b>2</b> Engage consumers and improve efficiency	<ul style="list-style-type: none"> <li>Teachers' time – cost efficiency</li> <li>Remote monitoring – cost savings</li> <li>Reduce missed appointment costs</li> <li>ePatient records – efficiency</li> <li>Secure messaging – efficiency</li> <li>Reduce admin. costs for businesses</li> <li>Reduce admin. costs for government</li> <li>Increase eCommerce</li> <li>Saves cost of debit/ credit cards</li> <li>Reduce malware attacks &amp; costs</li> <li>eMoney - efficiency</li> </ul>	<ul style="list-style-type: none"> <li>Reduces waste paper</li> </ul>	<ul style="list-style-type: none"> <li>Educational retention &amp; results</li> <li>Support disengaged learners</li> <li>Quality of healthcare</li> <li>Reduce stress for carers &amp; families</li> <li>Real-time tracking epidemics</li> <li>Advanced services in rural areas</li> <li>Convenient access to medical staff</li> <li>Automate insurance process</li> <li>Engage voters in democratic process</li> <li>Increase ease &amp; speed citizen feedback</li> <li>Save time</li> <li>Ease of access to products/ services</li> </ul>
<b>3</b> Build a greener mobile planet	<ul style="list-style-type: none"> <li>Energy efficiency</li> <li>Labour cost/ time savings</li> <li>Process efficiency</li> </ul>	<ul style="list-style-type: none"> <li>Smart grids, cities, buildings</li> <li>Smart manufacturing &amp; logistics</li> <li>Teleworking</li> <li>Network optimisation</li> <li>Charger standardisation</li> <li>Recycling</li> </ul>	<ul style="list-style-type: none"> <li>Control daily routines remotely</li> <li>Home security – remote access</li> <li>Real time energy usage information</li> </ul>
<b>4</b> Empower users and maintain consumer trust	<ul style="list-style-type: none"> <li>Reduce fraud</li> <li>Grow eCommerce market</li> <li>Grow security tools market</li> </ul>		<ul style="list-style-type: none"> <li>Consumer trust</li> <li>Child protection</li> </ul>

Source: GSMA

## Increase internet connectivity and drive productivity

*“The internet now is like a fridge – and you can’t live without a fridge”*  
(Focus group respondent)

Broadband is increasingly seen as an essential utility. The key impacts are:

- Productivity – both in-home and out-of-home – adding an aggregate €127bn (or 1.0% of 2009 EU GDP) to the EU economy from 2010-2015 in the low case, €225bn (or 1.8% of 2009 EU GDP) in the base case and €362bn (or 3.0% of 2009 EU GDP) in the high case (see the table below)<sup>75</sup>.
- A more connected society.
- Increased informal learning and knowledge share for all citizens. One respondent observed: *“Fast access to information will change the way we learn – this will be beneficial to society”*. Another mirrored this: *“We’re all more intelligent now – you’re being given more information all the time so your mind is widening”*.
- Increased creativity through user generated content tools.
- Increased social participation for those who cannot leave the house. One respondent noted: *“The internet provides disabled people with a window to the world, and allows them to participate in education and work from home”*.

Here we have valued only the productivity impact and hence our results can be seen as conservative.

Figure 11: Productivity Impact 2010-2015 (% of 2009 GDP)

Evidence (refers to Base Case unless otherwise stated)	NPV Productivity Impact 2010-2015 (as % of 2009 EU GDP)		
	Low	Base	High
Mobile broadband <b>out-of-home usage</b> drives productivity			
■ Wireless Intelligence (WI) forecasts that 3G penetration will reach 107% in 2015. We forecast that 3G usage (6.9% in 2008 <sup>76</sup> ) will grow at 1.5x the rate	€94bn (0.8%)	€154bn (1.3%)	€233bn (1.9%)

<sup>75</sup> Note: the productivity impact of mobile broadband in-home and out-of-home is €127bn in the low case and €362bn in the high case; this differs from the total productivity impact of ~€140bn in the low case and ~€390bn in the high case because of the separate impact of privacy on 3G usage – this is covered under the section on how mobile will “Empower Users and Maintain Consumer Trust”

<sup>76</sup> Wireless Intelligence 03 Aug 2009

of 3G penetration growth in the base case (1.4x in the low case and 1.6x in the high case), due to a tipping point in application and interface development as a result of the iPhone etc. The counterfactual is that 3G usage will grow at the same rate as 3G penetration growth.

- Concept Economics examined the Australian 3G market and found that 3G added 0.9% to GDP growth. Based on Australia's 3G penetration rate of 60.4% in 2009, this translates into a 0.15% increase in GDP growth for every 10% increase in broadband penetration<sup>77</sup>. We have used this as our base case.

**Mobile broadband facilitates 100% in-home broadband coverage, which drives productivity**

- Broadband penetration is forecast to grow from 42% in 2007 to 100% in 2015 due to expansion of fixed networks and mobile 'filling in' coverage gaps in rural areas. The counterfactual is that broadband penetration reaches 100% five years later, in 2020.
- In 2007, MICUS reported that broadband adds 0.71% to GDP growth. Based on the 2007 broadband penetration figure of 42%, this implies that every 10% of broadband penetration translates into 0.17% GDP growth<sup>78</sup> (assuming a straight-line correlation between GDP growth and broadband penetration).
- This is a total broadband impact. To calculate a mobile impact we estimate the total addressable market is 24% of EU households (using the proxy that 24% are mobile-only households<sup>79</sup> for cost or availability reasons). Of these, we estimate take-up will be equivalent to the ratio of 3G usage to 3G penetration in 2015 (i.e. even if it's available, some people may not choose to take up the service). Therefore, we calculate that mobile accounts for 12% of the total broadband GDP impact from the MICUS study in our low case, 13% in the base case and 15% in the high case.
- As a sense check, if the MICUS estimate is compounded it equates to ~4.3% over 6 years; our estimate for mobile compounded is ~1.4% over 6 years i.e. mobile accounts for a third of total broadband productivity impacts on GDP in 2015.

	Low	Base	High
	€33bn (0.3%)	€72bn (0.6%)	€130bn (1.1%)
<b>Total GDP impact</b>	<b>€127bn (1.0%)</b>	<b>€225bn (1.8%)</b>	<b>€362bn (3.0%)</b>

## Engage consumers and improve efficiency

### Mobile delivery of eCommerce

Mobile broadband allows eCommerce on the move. This will not only boost growth in the existing eCommerce market but will also facilitate the development of new business models. These developments will also likely enhance consumer confidence in eCommerce. Across the EU, we estimate that this will generate incremental revenues of €41bn (0.3% of 2009 EU GDP) in the base case.

Figure 12: Incremental Revenue from mCommerce 2010-2015 (% of 2009 GDP)

Evidence (refers to Base Case unless otherwise stated)	NPV Cost Savings 2010-2015 (as % of 2009 EU GDP)		
	Low	Base	High
<b>mPayment systems</b> drives growth in the eCommerce market			
■ The European eCommerce market is worth €207bn with 32% of all consumers having engaged in such transactions. If current trends continue, eMarketer forecasts a 25% CAGR to 2015 <sup>80</sup> .	€25bn (0.2%)	€41bn (0.3%)	€62bn (0.5%)
■ We assume that a 10% increase in 3G usage will increase the growth rate of the eCommerce market by 0.5% (a small increment to the already high growth of 25%). This is supported by findings that eCommerce usage correlates to broadband access – 49% of dial-up users vs. 64% of broadband users buy products/ services online from home <sup>81</sup> .			

<sup>77</sup> Next G Productivity Impact Study, Feb 2009, Concept Economics

<sup>78</sup> The Impact of Broadband on Growth and Productivity, 2008, MICUS

<sup>79</sup> Eurobarometer Special Survey: E-Communications Household Survey 2008, European Commission

<sup>80</sup> European eCommerce to reach €323bn in 2011, eMarketer

<sup>81</sup> E-Commerce in the US: Retail Trends, May 2005, eMarketer

## Mobile delivery of eLearning

The delivery of education materials and support via mobile has notable environmental, social and economic impacts. On an environmental level, providing course materials digitally saves on printing and paper usage. On a social level, mLearning can:

- Improve retention and results – a study by the UK Learning and Skills Council with 10,000 students in further education found an increase in retention of 8% and an improvement in achievement of 9.7%<sup>82</sup>. Mobile made learning more convenient for learners, helped teachers to provide differentiated activities to suit different learning styles and ability levels, and therefore made the lessons more interesting for pupils.
- Enable teachers to maintain a supportive dialogue with learners who attend lessons infrequently due to truancy, disability or illness.
- Encourage non-traditional learners and learners who have not succeeded in traditional education to engage in learning and to improve their self-confidence and self-esteem.
- Provide cost effective training for those living remotely. One respondent noted: “[Mobile broadband] would be important for providing education to those living in rural areas”.
- Encourage everyone to engage in learning. More than 35% of those doing vocational training use the internet for learning purposes<sup>83</sup>. Even of those not enrolled in courses, 26% use the internet to seek information for learning.

On an economic level, mobile can significantly reduce the cost of education and training provision through improved efficiency in the use of teachers’ time. Indeed, blended learning (a combination of e-learning and classroom based learning) is 20% less expensive than equivalent face-to-face teaching<sup>84</sup>. We estimate that mLearning can lead to a NPV cost savings ranging between €7.3-13.6bn from 2010-2015 – equivalent to ~0.1% of 2009 EU GDP (see table below).

Figure 13: Cost Savings from mLearning 2010-2015 (% of 2009 GDP)

Evidence (refers to Base Case unless otherwise stated)	NPV Cost Savings 2010-2015 (as % of 2009 EU GDP)		
	Low	Base	High
<b>mLearning becomes widespread</b>			
<ul style="list-style-type: none"> <li>■ Education compensation expenditure (staff costs) is forecast to remain constant at 70%<sup>85</sup> of current (non-capital, public &amp; private) education expenditure which itself remains constant at 92%<sup>86</sup> of total education expenditure.</li> <li>■ ‘Blended’ learning (i.e. a combination of face-to-face and eLearning) is estimated to create teaching cost savings of 20% per learner<sup>87</sup>.</li> <li>■ We assume that mobile 3G usage drives mLearning usage; however we conservatively estimate that only 10% of mobile 3G users will use mLearning<sup>88</sup> – both in schools and adult colleges.</li> </ul>	€7bn (0.1 %)	€10bn (0.1%)	€14bn (0.1%)

## Mobile delivery of eHealth

On a social level, telemedicine can:

- Increase the quality of care for patients by monitoring symptoms in real time and remotely, so that treatment can be adjusted accordingly. There are multiple interesting case studies such as:
  - AirStrip Technologies which offers a smartphone application that allows obstetricians to remotely view data on fetal and maternal heart rates for high risk pregnancies<sup>89</sup>.
  - A miniature digestible chip that can be attached to conventional medication and will send a signal informing if the patient has consumed his or her medication, with the potential to send reminders via mobile<sup>90</sup>.
- Reduce stress for carers and families of the chronically ill by ensuring patients are monitored. For example, one respondent commented: “[Remote tracking] would give me more independence rather than looking after my parents on a daily basis”.
- Automate the insurance process to save time and hassle for patients.
- Allow real-time tracking and reporting on the spread of epidemics, as well as providing timely advice on medical care to be delivered quickly to an entire population during natural disasters. Estimates for economic

<sup>82</sup> The Impact of Mobile Learning, 2009, LSN

<sup>83</sup> The Impact of Broadband on Growth and Productivity, 2008, MICUS

<sup>84</sup> The Impact of Broadband on Growth and Productivity, 2008, MICUS

<sup>85</sup> Education at a Glance 2008, OECD

<sup>86</sup> Education at a Glance 2008, OECD

<sup>87</sup> The Impact of Broadband on Growth and Productivity, 2008, MICUS. Note: eLearning can reduce teaching costs by 50% per learner whilst blended learning can reduce teaching costs by 20% per learner

<sup>88</sup> ICN forecast

<sup>89</sup> Take Two Digital Pills and Call Me in the Morning, Aug 2009, WSJ

<sup>90</sup> Take Two Digital Pills and Call Me in the Morning, Aug 2009, WSJ

losses from swine flu, for instance, range between 0.5% and 1.5% of GDP in affected countries over the course of the pandemic<sup>91</sup>.

- Provide advanced services in remote areas in a cost effective way through video conferencing and telemedicine. This could also save €1.1bn a year across the EU – based on the results of the Gesundheits Card Europa (GCE), used by 200,000 Germans<sup>92</sup>. This saving is integrated into the ePatient savings line in the table below.
- Provide quick doctors appointments via video conference for professionals stuck at work. A respondent noted: “Professional people will not have to waste time queuing to visit the doctor”.

On an economic level, telemedicine can reduce healthcare costs and improve efficiency in multiple ways – outlined in the table below.

Figure 14: Cost Savings from mHealth 2010-2015 (% of 2009 GDP)

Evidence (refers to Base Case unless otherwise stated)	NPV Cost Savings 2010-2015 (as % of 2009 EU GDP)		
	Low	Base	High
<b>Remote monitoring of patients can reduce visitation and medication costs</b>			
<ul style="list-style-type: none"> <li>■ Total (public and private) healthcare expenditure was €1,088bn in 2007 (8.8%<sup>93</sup> of GDP) and is expected to remain constant as a % of GDP going forward, because it has been flat for the last 4 years<sup>94</sup>.</li> <li>■ Based on a US case study, remote monitoring of patients with congestive heart failure, diabetes and chronic pulmonary disease can potentially save 1.0%<sup>95</sup> of total (public and private) healthcare expenditure.</li> <li>■ These three diseases represent the top three in terms of cost savings (due to cost to treat and prevalence in the population) – thus we estimate these three account for 75% of the total savings, to calculate a total saving of €46.0bn.</li> </ul>	€37bn (0.3%)	€46bn (0.4%)	€55bn (0.5%)
<b>Text messaging reminder schemes can reduce missed appointments and reduce costs</b>			
<ul style="list-style-type: none"> <li>■ Extrapolating from a UK case study, text messaging schemes to remind patients about appointments can save 0.3%<sup>96</sup> of total (public and private) healthcare expenditure in the EU.</li> </ul>	€9bn (0.1%)	€11bn (0.1%)	€13bn (0.1%)
<b>ePatient records can improve healthcare efficiency</b>			
<ul style="list-style-type: none"> <li>■ ePatient records could save 1.2%<sup>97</sup> of total (public and private) healthcare expenditure.</li> <li>■ Given that mobiles are personal devices that are always with us, we estimate mobile will account for 10%<sup>98</sup> of total ePatient records use and an equivalent % of the savings.</li> </ul>	€3bn (0.0%)	€4bn (0.0%)	€6bn (0.1%)
<b>Secure messaging between healthcare providers can improve healthcare efficiency</b>			
<ul style="list-style-type: none"> <li>■ Micus estimates that secure messaging systems will save 0.6%<sup>99</sup> of total (public and private) healthcare expenditure.</li> <li>■ We estimate mobile will account for 5%<sup>100</sup> of total secure messaging use (given usage at the sites of accidents in particular).</li> </ul>	€2bn (0.0%)	€2bn (0.0%)	€3bn (0.0%)
<b>Total NPV</b>	<b>€50bn (0.4%)</b>	<b>€64bn (0.5%)</b>	<b>€78bn (0.6%)</b>

## Mobile delivery of eGovernment

The impacts of mGovernment are social, environmental and economic. On a social level, mGovernment helps:

- Engage voters in the democratic process. Mobile is one of the best ways to engage with those demographics that are least likely to vote currently – with penetration highest in younger age groups<sup>101</sup> who have a lower propensity to vote<sup>102</sup>.

<sup>91</sup> The Cost of Swine Flu, Jul 2009, Economist

<sup>92</sup> The Impact of Broadband on Growth and Productivity, 2008, MICUS

<sup>93</sup> Eurostat Statistical Database

<sup>94</sup> ICN forecast

<sup>95</sup> Take Two Digital Pills and Call Me in the Morning, WSJ. Note: based on West Wireless Health Institute study quoted in the WSJ citing savings of \$10.1bn for congestive heart failure, \$6.1bn for diabetes and \$4.9bn for chronic pulmonary disease; US healthcare spending was worth US\$2.2 trillion in 2007

<sup>96</sup> European Mobile Industry Observatory 2008, GSMA; UK Treasury Budget 2007. Note: based on the experience of the NHS which could potentially save between £240m and £370m from text messaging schemes in 2006 based on a total current and capital spending of £76.4bn in 2005/2006

<sup>97</sup> The Impact of Broadband on Growth and Productivity, 2008, MICUS. Note: based on the IZIT system developed in the Czech Republic

<sup>98</sup> ICN forecast

<sup>99</sup> The Impact of Broadband on Growth and Productivity, 2008, MICUS. Note: based on the experience of the Danish Health Data Network

<sup>100</sup> ICN forecast

- Increase the speed, depth and frequency of citizen feedback on public services. This also has economic implications given an estimated annual spend by governments on research into citizen feedback of approximately €2.3bn<sup>103</sup>.
- Save citizens' time. One respondent in our focus group noted: "Online administration or e-admin would limit bureaucracy and save time".

On an environmental level, mGovernment facilitates the development of paperless administration, reducing waste. On an economic level, mGovernment can reduce administrative costs for businesses and consumers. This cost efficiency is quantified below.

Figure 15: Cost Savings from mGovernment 2010-2015 (% of 2009 GDP)

Evidence (refers to Base Case unless otherwise stated)	NPV Cost Savings 2010-2015 (as % of 2009 EU GDP)		
	Low	Base	High
<b>Reduction of administrative costs for businesses</b>			
<ul style="list-style-type: none"> <li>■ MICUS reports that government-related administrative costs for businesses amount to c. 3% of GDP<sup>104</sup>. According to the same study, online delivery of government services can reduce the costs by 56%<sup>105</sup>. Since this cost saving is based on a case study of the Netherlands, we conservatively assume that this is the high case (the estimates for the low case and base case are reduced according to the percentages set out at the front of this section).</li> <li>■ We assume uptake of mGovernment will be 10% of the usage of eGovernment services – which was 68% in 2008<sup>106</sup> (increasing by 3.9%<sup>107</sup> CAGR to 2015), given that the majority of administrative work will still be done from offices on fixed lines.</li> <li>■ Note that we forecast mobile broadband usage to be 59% by 2015 so the idea that a significant proportion of government services could be delivered via mobile seems reasonable.</li> </ul>	€22bn (0.2%)	€34bn (0.3%)	€50bn (0.4%)
<b>Reduction of government-to-citizen administrative costs</b>			
<ul style="list-style-type: none"> <li>■ Total government expenditure is equivalent to 46.3% of GDP and is expected to grow in-line with the economy<sup>108</sup>.</li> <li>■ According to the MICUS study, automation of government back office tasks can help reduce government administrative costs by €176bn pa<sup>109</sup>, equivalent to 3.1% of total government expenditure in 2007<sup>110</sup>.</li> <li>■ This number is for government to government interactions. The same study estimates that the savings for government to citizen interactions is 25% of this<sup>111</sup>.</li> <li>■ We expect that mobile broadband will contribute 20% of this cost reduction by 2015<sup>112</sup> (as above, the majority of the benefit will be through fixed line eGovernment provision)</li> </ul>	€19bn (0.2%)	€29bn (0.2%)	€42bn (0.3%)
<b>Total NPV</b>	<b>€41bn (0.3%)</b>	<b>€64bn (0.5%)</b>	<b>€91bn (0.7%)</b>

## Build a greener planet

The impact of mobile with regards to M2M is predominantly environmental and economic – energy efficiency, and related cost savings. Our focus group respondents were particularly interested in traffic-related initiatives, commenting:

<sup>101</sup> Residential Survey, Aug 2003, Oftel

<sup>102</sup> US Census Bureau

<sup>103</sup> ICN estimates: scaling up the size of the UK market research industry which is worth £1.5bn (£1.75bn) the European market research industry is estimated to be worth €12.0bn based on the UK's proportion of GDP which is equivalent to 14.5%; we assume that government spend on market research corresponds to its share of GDP which was 18.8% in 2008; this allows us to arrive at an estimate for government spend on consumer feedback equivalent to €2.3bn

<sup>104</sup> The Impact of Broadband on Growth and Productivity, 2008, MICUS

<sup>105</sup> The Impact of Broadband on Growth and Productivity, 2008, MICUS

<sup>106</sup> Eurostat Statistical Database

<sup>107</sup> Eurostat Statistical Database. Note: based on extrapolation of the average growth rate in 2007 and 2008

<sup>108</sup> Eurostat Statistical Database

<sup>109</sup> The Impact of Broadband on Growth and Productivity, 2008, MICUS

<sup>110</sup> Eurostat Statistical Database

<sup>111</sup> The Impact of Broadband on Growth and Productivity, 2008, MICUS

<sup>112</sup> ICN forecast

- *“Paying motorway tolls can slow traffic down and cause jams so why not allow payments to be made automatically via mobile broadband as you approach?”*
- *“If there were systems that calculated the most efficient routes there would be less pollution, less stress and it would be safer”*

Our respondents were also fascinated by the applications of M2M in the home. For example mobile could:

- Allow consumers to control daily home routines remotely – such as turning on the heating, checking the best before dates on the items in the fridge or starting the washing machine. This was a favourite among respondents with comments such as:
  - *“You could programme the washing machine before getting home, switch the lights on and off, and turn on the air conditioning in the summer”*
  - *“I could switch the heating on before I come home which would be perfect, or if I leave the house in a hurry I could switch things off”*
- Improve home security by allowing remote tracking of security cameras or alarms
- Allow remote checking of cars. One respondent noted: *“I would be interested in monitoring and controlling my car – if a weather report told me it was going to be cold the next day, before I got in my car in the morning, I could defrost the windscreen, check the oil levels and I could do it through the web”*
- Provide real time energy information (accessed from anywhere) that allows consumers to participate in their home energy management. For example, one respondent noted: *“[Mobile broadband] could measure the energy I use, and then propose something to tell me how to use less”.*

The environmental impact of the “green” mobile technology areas is substantial. The reduction of carbon emissions in 2020 is outlined here, and the energy saving impact in economic terms is calculated in the table below:

- Smart grids can reduce carbon emissions by 43.1 Megatonnes of CO<sub>2</sub> Emissions (MtCO<sub>2e</sub>)<sup>113</sup> a year
- Smart logistics can reduce carbon emissions by 35.2 MtCO<sub>2e</sub><sup>114</sup> a year
- Teleworking can reduce carbon emissions by 22.1 MtCO<sub>2e</sub><sup>115</sup> a year
- Smart cities can reduce carbon emissions by 10.5 MtCO<sub>2e</sub><sup>116</sup> a year
- Smart buildings can reduce carbon emissions by 6.5 MtCO<sub>2e</sub> a year<sup>117</sup>
- Smart manufacturing can reduce carbon emissions by 1.9 MtCO<sub>2e</sub><sup>118</sup> a year

The cost savings associated with each area of energy efficiency are outlined in the table below. It is important to note that these are predominantly derived from the conservative Carbon Connections report which only covers 13 mobile-specific opportunities; hence it is several times lower than the total ICT impact estimated by the Smart 2020 report produced by the Climate Group in 2008.

It is also important to note that these estimates exclude secondary economic impacts, beyond energy savings. For example, the roll out of smart grids will stimulate a new market for smart consumer appliances. Hence our figures can be seen as highly conservative.

Figure 16: Cost Savings from Reduction of Energy Consumption 2010-2015 (% of 2009 GDP)

Evidence (refers to Base Case unless otherwise stated)	NPV Cost Savings 2010-2015 (as % of 2009 EU GDP)		
	Low	Base	High
<b>Dematerialisation/ teleworking</b>			
■ Dematerialisation in the form of mobile telepresence, virtual office and mobile delivery notifications for eCommerce is forecast to yield energy savings of €7.7bn <sup>119</sup> in 2015. The aggregate NPV to 2015 is stated in the columns on the right.	€19bn (0.2%)	€24bn (0.2%)	€28bn (0.2%)
<b>Smart Grids</b>			
■ Smart grids in the form of energy network monitoring and smart metering is forecast to yield energy savings of €6.2bn <sup>120</sup> in 2015.	€15bn (0.1%)	€19bn (0.2%)	€23bn (0.2%)
<b>Smart Logistics</b>			
■ Smart logistics in the form of centralised and decentralised tracking, loading optimisation, onboard telematics and remote supply control is forecast to	€18bn (0.1%)	€22bn (0.2%)	€27bn (0.2%)

<sup>113</sup> Carbon Connections, Jul 2009: Accenture. Note: 2020 figures; no figures are available for 2015

<sup>114</sup> Carbon Connections, Jul 2009: Accenture. Note: 2020 figures; no figures are available for 2015

<sup>115</sup> Carbon Connections, Jul 2009: Accenture. Note: 2020 figures; no figures are available for 2015

<sup>116</sup> Carbon Connections, Jul 2009: Accenture. Note: 2020 figures; no figures are available for 2015

<sup>117</sup> Smart 2020, 2008, The Climate Group. Note: 2015 figures as estimated by ICN; based on carbon emissions of 501 MtCO<sub>2</sub> in 2002, carbon abatement potential of c. 5.7%, a growth in building emissions of 2.3% a year and a technological adoption rate of 5.0% a year

<sup>118</sup> Carbon Connections, Jul 2009: Accenture. Note: 2020 figures; no figures are available for 2015

<sup>119</sup> Carbon Connections, Jul 2009: Accenture. Note: based on straight-line interpolation of expected energy cost savings of €14.1bn in 2020

<sup>120</sup> Carbon Connections, Jul 2009: Accenture. Note: based on straight-line interpolation of expected energy cost savings of €11.4bn in 2020

yield energy savings of €7.2bn <sup>121</sup> in 2015.			
<b>Smart Cities</b>			
■ Smart cities in the form of urban traffic management systems and utilities monitoring systems are forecast to yield energy savings of €2.0bn <sup>122</sup> in 2015.	€5bn (0.0%)	€6bn (0.1%)	€8bn (0.1%)
<b>Smart Manufacturing</b>			
■ Smart manufacturing can increase manufacturing process efficiency, support predictive maintenance and optimise order fulfilment. This can lead to energy savings of €0.4bn <sup>123</sup> in 2015.	€1bn (0.0%)	€1bn (0.0%)	€2bn (0.0%)
<b>Smart Buildings</b>			
■ Total carbon emissions from global energy usage by buildings were 8,340 MtCO <sub>2</sub> in 2002 <sup>124</sup> .	€1bn (0.0%)	€1bn (0.0%)	€1bn (0.0%)
■ Based on a growth rate of <i>global</i> building energy use of 2.3% <sup>125</sup> , we estimate that energy usage by buildings will result in the emission of 11,209 MtCO <sub>2</sub> in 2015. The European figure for emissions is calculated using the European share of carbon emissions – 14.9% <sup>126</sup>			
■ The Smart 2020 report <sup>127</sup> forecasts that smart buildings can create a 5.7% reduction in energy usage based on the contributions of Buildings Management Systems, Heating, Ventilation and Air Conditioning Systems and Lighting Automation Systems. To be conservative we estimate that only 5% of buildings will have be fitted with smart technology each year based on the report's observation that residential buildings take roughly 20-25 years to adopt new technology whilst commercial buildings take roughly 15 years. Therefore smart buildings are forecast to enable a reduction of 38.7 MtCO <sub>2</sub> of carbon emissions in Europe in 2015.			
■ We divided carbon emissions by the cost of carbon emissions - €20 <sup>128</sup> - allowing us to arrive at a figure for energy savings			
<b>Total NPV</b>	<b>€59bn</b> (0.5%)	<b>€73bn</b> (0.6%)	<b>€88bn</b> (0.7%)
<b>Total NPV + a multiplier of 20% (to account for mobile-based energy saving opportunities not covered in the key source document<sup>129</sup>)</b>	<b>€70bn</b> (0.6%)	<b>€88bn</b> (0.7%)	<b>€106bn</b> (0.9%)

The industry will also work to reduce its carbon footprint, particularly through network optimisation (e.g. more efficient base stations amplifiers, standby power management etc), handset recycling, and standardisation and efficiency initiatives for chargers

## Empower users and maintain consumer trust

The impact of security and privacy tools on consumer trust and on business resilience to attack is somewhat hard to quantify. Below we have estimated the impact of increased mobile broadband usage (and therefore productivity) resulting from increased consumer confidence, and the cost savings resulting from reduced malware attacks.

Figure 17: Increased Usage Impact of Increased Consumer Confidence 2010-2015 (% of 2009 GDP)

Evidence (refers to Base Case unless otherwise stated)	NPV Impact 2010-2015 (as % of 2009 EU GDP)		
	Low	Base	High
Security and privacy tools will increase usage, driving incremental productivity			
■ Wireless Intelligence (WI) forecasts that 3G penetration will reach 107% in 2015. With the right security and privacy tools in place, we forecast a 5% increment to our forecast growth rate for mobile broadband.	€14bn (0.1%)	€20bn (0.2%)	€26bn (0.2%)
■ As we have shown, GDP increases by 0.15% for every 10% increase in broadband penetration <sup>130</sup> . From this we can calculate the incremental impact on GDP of privacy and security tools.			

<sup>121</sup> Carbon Connections, Jul 2009: Accenture. Note: based on straight-line interpolation of expected energy cost savings of €13.2bn in 2020

<sup>122</sup> Carbon Connections, Jul 2009: Accenture. Note: based on straight-line interpolation of expected energy cost savings of €3.7bn in 2020

<sup>123</sup> Carbon Connections, Jul 2009: Accenture. Note: based on straight-line interpolation of expected energy cost savings of €832.2m in 2020

<sup>124</sup> Smart 2020, 2008, The Climate Group. Note: MtCO<sub>2</sub> refers to mega tonnes of CO<sub>2</sub> emissions

<sup>125</sup> Curbing Global Energy Demand Growth - The Energy Productivity Opportunity, May 2007, McKinsey

<sup>126</sup> Climate Analysis Indicators Tool, 2009. World Resource Institute

<sup>127</sup> Smart 2020, 2008, The Climate Group

<sup>128</sup> Smart 2020, 2008, The Climate Group

<sup>129</sup> Carbon Connections, Jul 2009: Accenture

<sup>130</sup> Next G Productivity Impact Study, Feb 2009, Concept Economics

Figure 18: Cost Savings from Containing Malware Attacks 2010-2015 (% of 2009 GDP)

Evidence (refers to Base Case unless otherwise stated)	NPV Cost Savings 2010-2015 (as % of 2009 EU GDP)		
	Low	Base	High
<b>Containing the costs and spread of mobile malware</b>			
<ul style="list-style-type: none"> <li>■ Europe accounts for approximately 25%<sup>131</sup> of total malware <i>viruses</i> and sustained ~€2.3bn in corporate malware costs in 2006 (global costs were €9.1bn in 2006<sup>132</sup> and we assume that the costs are equally spread between viruses). Consumer-related malware costs are reported to be the same again<sup>133</sup> - giving a total European cost of ~€4.6bn.</li> <li>■ To calculate a total cost for mobile viruses in 2015, we need number of viruses*attacks per virus*cost per attack.</li> <li>■ Mobile represented just 0.1% of total viruses in 2005<sup>134</sup> (226 viruses) but is forecast to grow exponentially to 2015<sup>135</sup> (140,000 viruses) driven by the prevalence of smart phones and mobile broadband usage.</li> <li>■ The number of attacks per virus is also growing due to increased connectivity and communications. Attacks are growing at c. 170%<sup>136</sup> (from c. 362,000 in 2006 to over 2.6m in 2008). We use this rate to estimate 2015 attacks.</li> <li>■ We forecast that the cost per attack will increase at 10% of the growth rate of malware viruses; as the number of viruses increases we expect that the average cost of a virus decreases due to the involvement of amateur developers.</li> <li>■ Conservatively, we estimate that tools would prevent 25% of all attacks, leading to the numbers in this table.</li> </ul>	€6bn (0.1%)	€8bn (0.1%)	€10bn (0.1%)

## Methodology

### High, base and low case

In all base case calculations we have generated our own assumptions with reference to published figures from the available literature. Key points to note are:

1. Where the report covers only part of the total market impact<sup>137</sup>, we apply a multiplier to calculate the total market impact
2. Where exchange rates are required, we use: USD/ EUR = 0.7016 and GBP/ EUR = 1.1654
3. Where figures are only available for world markets, we approximate the size of the European market by multiplying the world market size by Europe's share of world GDP (~21.3%)
4. Where we believe the estimates to be bullish, we use the published figures as the high case and scale the data downward for the low case and base case<sup>138</sup>. Otherwise, we use the published figures as the base case and flex all relevant, mutually exclusive assumptions by 20% up or down for the high and low cases respectively

Our counterfactual is always that there will be some growth in the use of mobile irrespective of the Manifesto (and policy triggers), and that this is already baked into the baseline GDP figures. If all of the suggested policies are implemented, this will accelerate and embed the use of mobile in each Manifesto area.

### Economic impacts

To calculate each economic impact we have used one of the following approaches:

1. **Efficiency cost savings:** For areas where we had access to case study data which provided the impact as a cost saving, or efficiency gain, we have calculated a gain in economic value (as producers' surplus, which, if competed away, is likely to be enjoyed as consumer surplus). We assume that all cost savings are net of implementation costs.

<sup>131</sup> Symantec Global Internet Security Threat Report 2008, Symantec

<sup>132</sup> Financial Aspects of Network Security 2008, International Telecommunications Union

<sup>133</sup> ICN estimates

<sup>134</sup> Time to Prepare for Mobile Malware, Jun 2008, Wireless Week. Note: as reported by F-Secure till Mar 2008, there were 4001 mobile malware attacks and 640,000 total malware attacks

<sup>135</sup> 2006: Year of the Mobile Malware, Dec 2005, CNET.com. Note: based on the number of mobile malware viruses in 2005 and 2006; this growth rate is extrapolated forward based on a decline in the annual growth rate of 20%

<sup>136</sup> Worldwide Malware Signature Counter, May 2009, Triumphant

<sup>137</sup> Note: for example, Vodafone's Carbon Connections report only considers the impact of 13 specific mobile energy saving technologies. We therefore apply a multiplier of 1.2x to represent the full opportunity

<sup>138</sup> Note: for example, cost savings of governmental related for businesses from the use of broadband is 56% as stated in the MICUS study is used as the high case in calculating our impact figures

We apply a social discount rate of 3% (based on the Stern Review<sup>139</sup>) in all cases to ascertain the NPV. The NPV is based on 2010 to 2015; clearly the benefits in perpetuity would be much larger. For each cost saving, we assume that the effect begins in 2010 and is straight lined to the stated total impact (from the case studies) in 2015. This NPV is represented as a % of 2009 EU GDP.

2. **Productivity improvements:** For areas where we had access to case study data which provided the impact as a percentage of GDP, or a productivity gain, we have calculated a gain in economic value based on implementation of the Manifesto until 2015. We apply a social discount rate of 3% (based on the Stern Review<sup>140</sup>) to ascertain the net present value (NPV). The NPV is based on 2010 to 2015; clearly the benefits in perpetuity would be much larger. This NPV is represented as a % of 2009 EU GDP.
3. **Incremental revenue:** For areas where the case study data provided impact as revenue growth we have calculated the NPV of aggregate incremental revenue from 2010 to 2015. We apply a commercial discount rate of 11% (based on the US CBO<sup>141</sup>) in all cases to ascertain the NPV. The incremental revenue as a result of implementing the Manifesto from 2010 to 2015 is based on the difference in revenue between the counterfactual and the scenario cases. This NPV is represented as a % of 2009 EU GDP. Note that incremental revenue is not equal to economic value because there are many indeterminable variables (e.g. prices rising because of falling competition – thus destroying rather than creating value for consumers).

For reference we define productivity and efficiency in the following way:

- Productivity – creating more output using the same resources i.e. increasing margins
- Efficiency – creating the same output with less resources i.e. cost savings

#### *Social & environmental impacts*

For each Manifesto point we also highlight the social and environmental impacts, with reference to case study data, and comments from focus groups carried out in Poland and Spain as part of this project.

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<sup>139</sup> Stern Review: The Economics of Climate Change, Oct 2006, Office of Climate Change, UK

<sup>140</sup> Stern Review: The Economics of Climate Change, Oct 2006, Office of Climate Change, UK

<sup>141</sup> US Congressional Budget Office

## Chapter 6

### Policy actions

#### Summary

To achieve this Manifesto, and create the positive impacts identified, the industry needs:

- **More spectrum** – develop a harmonised roadmap for release
- **Roll-out support** – remove barriers to eco-efficient coverage expansion
- **Demand stimulation** – be pro-mobile in public services, utilities and infrastructure
- **Consumer education** – promote user responsibility for online data and security
- **Network management** – continued flexibility to preserve choice and quality of service

#### More spectrum – develop a harmonised roadmap for release

***The EC should accelerate the harmonised deployment of available spectrum (including the 790-862MHz band) across all member states to facilitate a smooth transition to next generation mobile, universality and competition.***

Given Europe's strength and opportunities in mobile, there is political and economic urgency behind the accelerated deployment of available spectrum. As stated by Commissioner Reding:

*"The incremental value of using the digital dividend spectrum for wireless broadband across the EU is estimated to be between €150 – €200 billion. The digital dividend could allow Europe to extend its leadership in electronic communications services, creating growth and jobs, increasing productivity and giving greater access to broadband services for all Europeans."<sup>142</sup>*

Ultimately decisions on spectrum are made at a national level, however, the economies of scale generated by introducing harmonised services means that centralised coordination would generate significant benefits for all European markets. Currently countries including Italy, Belgium and Portugal are lagging behind in the digital dividend debate. Getting these countries back on track for full harmonisation has multiple benefits. Making the 790-862 MHz band available on a harmonised basis both in terms of timing and technicals will act as an economic stimulus. It will create economies of scale allowing the delivery of mobile broadband services to rural Europe as cheaply as possible, and bridging the digital divide.

Specifically the EC should:

- Create harmonised technical conditions for use of the 790-862MHz band – specifically through co-ordination of activities within Europe (e.g. technical implementation) and, on the borders of Europe, with surrounding countries (e.g. promotion of harmonised usage)
- Ensure harmonisation of deployment in Europe within appropriate timescales
- Focus on making the spectrum available on a technically harmonised basis and at the lowest possible cost to make it commercially attractive for mobile operators to provide mobile broadband to rural areas. Operators want this band to improve their rural coverage in a cost-efficient manner because geographical coverage is a selling argument when competing for subscribers in the end user markets

***The EC should review spectrum usage and future requirements of mobile and non-mobile applications, working with the ITU where appropriate, covering availability, technology choices and timelines. National regulatory authorities should put in place mechanisms to incentivise efficient usage.***

Spectrum is a valuable resource and it is important to ensure that it is being used efficiently, both now and in the future. The development of a roadmap, in collaboration with mobile and other parties, would specifically involve:

- Assessing overall allocations within Europe
- Assessing the value of European harmonization, and then the incremental value (e.g. economies of scale) of harmonization beyond R1
- Reviewing the release of a second digital dividend band (694+ MHz)
- Reviewing additional future spectrum needs of mobile

<sup>142</sup> GSMA Response, Radio Spectrum Policy Group Opinion of Digital Dividend, 30 Jun 2009, GSMA

- Calculating the economic impact for the EU of different spectrum usage scenarios to ensure an appropriate balance is struck

In terms of incentivising efficient usage, a single pan-European solution may not be appropriate. Instead national solutions should combine appropriate mechanisms, which might include:

- Liberalisation of spectrum (i.e. allow a commercially based decision regarding which technology to implement in which band such as GSM, UMTS, HSPA and LTE etc; however liberalisation may create problems for harmonisation if it is too generic)
- Trading
- Refarming funds (using public money or funds from AIP whilst ensuring the latter does not artificially penalise incumbent users who are highly efficient)
- Encouraging sharing
- Incentivising innovation

### Roll-out support – remove barriers to eco-efficient coverage expansion

***The EC should encourage member state governments to review and streamline country and town planning procedures to facilitate faster and wider roll-out of mobile broadband. Frameworks should also be put in place at a national level for specific exemptions, and/or public-private investment, for eco-efficient towers and masts.***

Fragmented national planning policies and requirements for multiple authorisations create significant delays and uncertainties in mobile network deployments, as well as increasing the costs of roll-out<sup>143</sup>. Governments should review these to ensure consistent good practice, and address community concerns through education and other means. The review should weigh the benefits of prohibiting towers and masts in ‘Right of Way’ areas against the increased costs (and decreased breadth therefore) of roll-out if these areas are not used.

Specific exemptions for eco-efficient towers and masts would also have a significant impact. Base stations can account for up to 90% of a mobile network’s total energy consumption<sup>144</sup>. Energy efficiency can be improved through multiple techniques including the use of renewables. Solar-powered base stations, for example, can reduce site energy consumption by up to 30%<sup>145</sup> and would significantly reduce mobile’s carbon footprint. European operators are already conducting trials to roll out solar-powered base stations. Mobile equipment manufacturers have also committed themselves to conducting parallel R&D.

Public and private investment could also be considered for the roll-out of energy efficient base stations. India’s Department of Telecoms for example recently announced a scheme to utilise part of its USO fund to subsidise the installation of mobile towers that run on renewable sources of energy such as wind or solar<sup>146</sup>. To supplement public subsidies, the EC and national governments can also play a role in encouraging private investments in renewables – in particular through the creation of favourable frameworks and regulatory environments.

***The EC should ensure that policies for electromagnetic fields are consistent with World Health Organization recommendations.***

There are *some* community concerns about the siting of cell sites related to exposure to electromagnetic fields (EMF) – although this is not among EU citizens’ top ten environmental worries<sup>147</sup>. Typical exposure from base stations however is lower than European and international exposure recommendations. Exposure is in the 0.002%-2% range which is lower than, or at least comparable to, RF exposure from radio or television broadcast transmitters<sup>148</sup>. The World Health Organization has concluded that: ‘*considering the very low exposure levels and research results collected to date, there is no convincing scientific evidence that the weak RF signals from base stations and wireless networks cause adverse health effects.*’<sup>149</sup>

<sup>143</sup> Building Mobile Networks: European Mobile Operator Responses to Public Concerns, Nov 2007, GSMA. Note: GSMA Europe is working on an update to the planning section, including delays

<sup>144</sup> World’s Most Energy Efficient Base Station Wins Best Network Technology Advance at GSMA Global Mobile Awards 2009, Nokia Siemens Networks

<sup>145</sup> World’s Most Energy Efficient Base Station Wins Best Network Technology Advance at GSMA Global Mobile Awards 2009, Nokia Siemens Networks

<sup>146</sup> USO Funds For Renewable Energy-Powered Cell Towers, Jul 2009, The Hindu Business Line

<sup>147</sup> Eurobarometer Special Survey: Electromagnetic Fields, 2007, European Commission

<sup>148</sup> Electromagnetic Fields and Public Health, May 2006, WHO

<sup>149</sup> Electromagnetic Fields and Public Health, May 2006, WHO

While most countries of the European Union follow the European Council recommendation of 1998, in some, policies have been adopted that impose lower limits for exposure to radio signals<sup>150</sup>. These policies are not based on scientific evidence of established health risks; rather they are a political response to public concern.

One consequence of EMF restrictions is that it may act as a barrier to site sharing (which is elaborated below). For example, it may be virtually impossible for antennas to share rooftops; this has been reported for Switzerland where the limits are 10 times more restrictive than the European Council recommendation<sup>151</sup>.

We request that the EC continue to support science-based EMF exposure limits and that it encourages member states to review policies to remove non-scientific restrictions. This is in line with the European Parliament vote of April 2009 calling for continued review of EMF recommendations and siting policies determined by scientific criteria<sup>152</sup>.

***The EC should encourage commercially-based infrastructure sharing, where it is technically feasible, to promote energy and cost efficiency.***

Infrastructure sharing may be passive (for example, shared masts) or active (for example, shared transmission equipment). All European operators share infrastructure for cell sites<sup>153</sup>. Network sharing can be more energy and cost efficient than individual cell sites, especially where operators jointly agree to deploy new networks<sup>154</sup>. A GSM Base Station 2/2/2, for example, requires 600-1800W of power whereas a station with double the capacity requires just 300-500W more power (900-2300W)<sup>155</sup>. It may be more difficult for existing networks where deployment plans differ and where masts must be upgraded to support additional antennas.<sup>156</sup>

We request that the EC ensure that infrastructure sharing is encouraged on a commercial basis where it is technically feasible and consistent with competition rules.

### **Demand stimulation – be pro-mobile in public services, utilities and infrastructure**

***The EC should set targets for getting government services online across member states and ensure that all (existing and new) eGovernment services are mobile enabled.***

The mobility premium in service provision is powerful – and can hugely increase productivity and improve efficiency as we have shown. There is significant value therefore in delivering core public services on mobile. Investment is needed in robustness and security for data delivery to be reliable enough for mission-critical distribution services. Two changes will help mobile operators to make a case for this investment:

- Digital dividend spectrum to improve in-building robustness and broadband coverage in rural areas
- Confidence in demand levels – which can be created by government committing services to delivery on mobile

***The EC should set targets for getting health and education services online across member states and ensure that all (existing and new) ePublic Services are mobile enabled.***

The efficiency and engagement impacts of ‘mobilising’ public services are significant, as we have shown. Clearly there are upfront capital requirements to optimise ePublic Services for mobile and ensure seamless integration of systems but by setting targets the EC can lead this migration.

In terms of healthcare, top-down political impetus is crucial. The buyers in healthcare are fragmented regional health authorities with no co-ordinated procurement, and no funding certainty year-to-year making them highly risk averse in terms of new technology investment. A set of clear guidelines and targets would allow national health organisations to change the long term strategy and support these changes at the regional level.

***Member state governments should incorporate ICT into utility and infrastructure policies, recognising the role mobile can play in areas such as smart grids and traffic management. Specifically, it should also support the role of mobile and other existing, standardised wireless networks in M2M solutions.***

<sup>150</sup> Application of Council Recommendation on the Limitation of Exposure to EM Fields, 2008, European Commission

<sup>151</sup> Health, Environment and Society: Second Mobile Communications Seminar, 2004, GSMA and MMF

<sup>152</sup> Health Concerns Associated with Electromagnetic Fields, 2009, European Parliament

<sup>153</sup> Building Mobile Networks: European Mobile Operator Responses to Public Concerns, Nov 2007, GSMA

<sup>154</sup> Tele2 and Telenor to Jointly Build LTE Network in Sweden, Apr 2009, Cellular News

<sup>155</sup> Alternative Power for Mobile Telephony Base Stations, 2007, Motorola

<sup>156</sup> Mobile Infrastructure Sharing, 2008, GSMA

Historically, ICT policy has been unrelated to, and therefore separate from, utility and infrastructure policy. Given the potential of M2M, policy making now needs to take a more joined-up approach. To optimise M2M roll-outs it is important to have scale and standardisation for interoperability and future-proofing. We therefore request that member state governments secure a role for existing mobile and wireless networks in M2M solutions rather than supporting new, more costly and non-standardised private networks.

***The EC should develop EU-wide energy efficiency and smart building policies for homes and offices to stimulate demand, and lead in this area by implementing ‘smart’ technology in its own buildings. They should also support consumer educational and marketing efforts to bring about behavioural changes to maximise the impact of M2M embedded technologies.***

By putting in place policies around the implementation of M2M in homes and offices, member states can drive up-take, thereby creating economies of scale in the market and stimulating R&D investment. Once smart technologies are implemented, behavioural change is needed to maximise their impact. Member states can support this behavioural shift through consumer educational and marketing efforts.

### **Consumer education – promote user responsibility for online data and security**

***The EC should collaborate with stakeholders (device manufacturers, SIM manufacturers, operating system developers, application developers, vendors and online service providers) to understand the privacy and security challenges of mobile broadband, and help to raise consumer awareness. The EC should help redefine a sustainable relationship between users and suppliers of digital services, such that users assume responsibility for the privacy and security of their data online and suppliers provide tools to help them manage this.***

The usage, and therefore value, of online content and services is maximised in an environment where trust exists between consumers and providers. It is not sustainable for service providers to try to police the entire web, and all usage thereof. What they can do however is provide tools (such as digital signatures and site certification prompts) for users to protect their own data, and protect their children during web usage. These tools will become increasingly important as eMoney is rolled-out. In a world with available, user-friendly tools, users are empowered to take responsibility for their own privacy and security. The EC can also play an important role in raising consumer awareness about privacy and security issues (engaging with ENISA) and facilitating the uptake of these tools.

***The EC should consolidate the numerous fragmented programmes within the EU looking at the issues of privacy, identity, trust and safety, and it needs to be drive consistency in the interpretation and application of privacy laws.***

A plethora of programmes exist across the EU related to privacy, identity, trust and safety, each with their aims and recommendations. To create a consistent, coherent and sustainable framework, the EC needs to bring these together.

Moreover, there needs to be consistency in the interpretation and application of privacy laws. The Green Knowledge Society report goes even further to suggest a new body of law: “*We need to move towards a coherent and overarching ICT policy as the way governments support a ‘knowledge society’. Such a policy should embrace the rigour of consumer protection ... with its own body of administrative law, such as that concerning privacy, online profiling and retention of data.*”<sup>157</sup>

### **Network management – continued flexibility to preserve choice and quality of service**

***The EC should continue to support operators employing ‘reasonable’ network management and managing dynamic traffic patterns.***

The mobile industry is an important enabler of digital services. Mobile operators are investing in their networks and innovating services, in order to offer consumers choice and a wide portfolio of options to suit their particular needs and interests.

To deliver existing and new internet services whilst supporting the corresponding increase in data volumes, operators need to manage traffic. This is to ensure networks run smoothly, deliver services reliably and meet the expected customer experience for all services. This is particularly important for mobile operators, who need to manage the

<sup>157</sup> A Green Knowledge Society, Sep 2009, SCF Associates

appropriate allocation of finite radio spectrum capacity and dynamic traffic patterns across a wide range of services and customers.

Different services require different treatment by the network, voice traffic needs to be 'real time' where as video downloads can be buffered without impacting the overall experience. Consumers and business have high expectations about the standard at which networks operate and services are delivered. Operators want to maximise customers' experience, by ensuring that all services are provided according to their particular quality requirements; traffic management enables this.

Operators need to provide high quality services to all customers – citizens, public and private organisations.. Operators have to safeguard overall network performance, by managing applications and services that might harm the experience of others. A network's scarce resources have to be shared between multiple consumers, using different services.

Innovation in services is also driven by network management capability. New services are emerging that, in a 'best-effort' environment, could not be successfully provided. Mobile internet services continue to evolve, from the text-based browsing of the early days, to enabling a full internet browsing experience via the mobile broadband connections of today, to new innovative IP-based services, such as location-based applications and video conferencing. This has been made possible by significant investment in network technologies, as well as advances and innovations in network management techniques. Services in the future will be ever more sophisticated. In order to deliver the right customer experience, network management will be essential.

Networks need the flexibility to operate, evolve, improve and innovate.. Traffic management is essential to deliver innovative services that work, to provide the quality of services that consumers and businesses expect, and to be able to support new ways of doing things. It is important that EC policies support this continued development and innovation of the internet. Restricting traffic management would limit future possibilities.

The new EU Telecoms Package provides the principles that are critical to innovation, by ensuring transparency and enabling the industry to manage traffic effectively. We support the existing regime and would like to see it upheld to ensure consumer choice, investment, quality of service and, crucially, the continued innovation leadership of the European mobile industry.

