



Suruhanjaya Komunikasi dan Multimedia Malaysia
Malaysian Communications and Multimedia Commission

Brief Industry Trends Report

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SUMMARY HIGHLIGHTS

FOREWORD	2
SUMMARY HIGHLIGHTS	3
<i>GREEN TELECOMS: A NEW FORCE MAKING A DIFFERENCE</i>	
The Changing Times	4
Telecommunications Industry – Carbon Footprint Impact on the Environment	5
Making \$ and Sense of Green Telecommunications	6
Practicing What They Preach	7
Green Solutions from the Telecommunications Industry	9
Mobile Phones and Phones – Green Initiatives	9
Recycling as a Greener Solution	10
Mobile Applications Greener Lifestyle	13
Batteries and Chargers – Greening to Save Materials and Energy	14
Personal Computers – Green Efforts	14
Dematerialisation Through E-Billing	15
Base Stations – Greening the Network	16
Green Data Centres	17
Teleworking and Teleconferencing for Green Miles	17
Green Broadband in Communications	18
Malaysian Mobile Service Provider Strategies	18
Conclusion – Going Green for Survival of Generations to Come	19
<i>SMARTPHONE – OFFERING PROMISES OF RICH APPLICATIONS</i>	
Introduction	21
How Smartphone Differs from other Mobile Device	22
Key Smartphone Features	22
Smartphone Applications	23
Industrial Applications	23
Professional Applications	23
Entertainment and Home Applications	24
Operating Systems (OS)	26
Risk and Security Issues	27
Limitations to Smartphone Adoption	29
Smartphone Market Size	31
BlackBerry and iPhone – An Overview	33
2009 Smartphone Product Comparisons	35
Moving Forward – Opportunities and Expectations	37
APPENDIX	42
ACRONYMS	45
CONTACT US	46

FOREWORD

The Brief Industry Trends Report published for the first half of the year 2009 is the third publication under this category, which was started in 2008. This publication is developed on a half-yearly basis and is purposed to report and discuss on areas of topical interest including updates on the developments in the communications and multimedia (C&M) industry. Overseas developments which impact on or relate to Malaysian development in the C&M markets are highlighted in terms of observations, trends and contrasts.

The Brief Industry Trends Report for first half 2009 features two areas of C&M industry development much in focus at this time. They are the aspects of using more Green Energy and the increasing take up of smartphones in the mobile arena.

The feature *Green Telecoms – A New Force Making a Difference* provides observations on the developments of going green, and in particular, the telecommunications sector. Reasons for going green are discussed along with the benefits and the caution or precautionary aspects in the journey of going green. Specific initiatives taken by C&M industry players in sustaining the environment and lessening the impact of global warming are included.

The second feature in this report highlights the development of smartphones from the context of fundamental operating systems, applications and functionalities. Contrasts of smartphones versus the rest of the mobile computing devices are also briefly highlighted besides trends in the global smartphone market.

This report is available at the SKMM's website:

http://www.mcmc.gov.my/what_we_do/Research/bit.asp

I trust this report will be useful to all our readers in further understanding the workings or progress of the C&M industry or its developing market segments and services. Perhaps also in leading insights into new areas of development or rejuvenation of the old in keeping pace with the fast changing world of "telecoms". To improve this publication in the future, we welcome any comments, enquiries, suggestions and feedback on the information presented in this report. Please send them to webmaster@cmc.gov.my

Thank you



Dato' Mohamed Sharil Tarmizi
Acting Chairman/COO
Malaysian Communications and Multimedia Commission

SUMMARY HIGHLIGHTS

GREEN TELECOMS: A NEW FORCE MAKING A DIFFERENCE

For a long time, the “green” movement was something that only the environmentalists worried about in view of the depleting ozone layer affecting climate change. However, in today’s changing times, going green is no longer just an environmentalist concern but incorporates top level corporate attention within enterprises, organisations and industries around the world. This includes the telecommunications sector that is also shifting to “greener” movement and demonstrating deep concern over its business impact on global warming and related environmental issues being soon to be one of the major contributors to global warming. Nevertheless, it is reported that ICTs comprising telecommunications, computing and Internet (excluding broadcasting transmitters and receivers) which account for only around 2.5% of total green house emissions today, is an enabler to act as a catalyst and a driver in the transition to a low carbon economy. This is done through its part played in controlling and reducing the other 97.5% CO₂ emissions caused by activities in other sectors.

Some telcos have adopted a holistic green management framework to build a value proposition that drives lower carbon emissions. Others made remarkable efforts in designing environmentally friendly products ranging from green handsets to low energy consuming or emitting computer applications, base stations and data centres. All this aimed to make Planet Earth sustain as a better place to live in today and for generations to come. Telcos are not only taking going green as a wake-up call, but are taking it as a business advantage and strong selling point. However, while at it the telecoms industry also requires a more systematic and standardised measurement of energy efficiency. Such guidelines provide rates of success and pointers on extent of mitigation through reducing carbon footprint, while keeping business as usual.

SMARTPHONE – OFFERING PROMISES OF RICH APPLICATIONS

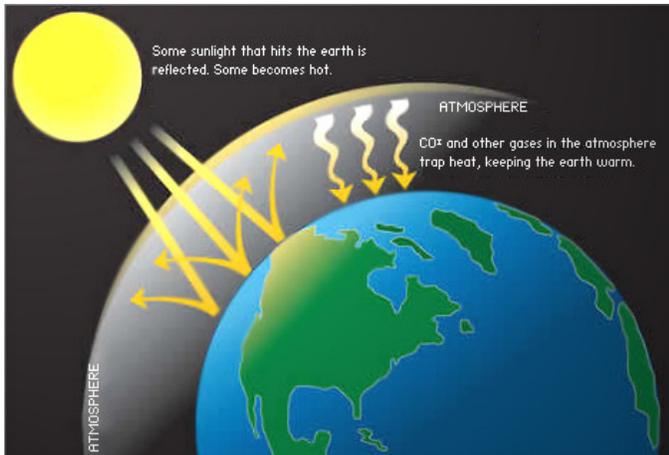
Smartphone, as the name implies, is designed to operate “smarter” than the typical mobile phone. It provides an integration of PC-like functionality in a handset. Technology in smartphone is evolving relatively fast, with smartphone presenting abilities not only as a mobile phone but also a platform of much functionality to send and receive emails, play music like an MP3 player, capture cherished moments with an embedded camera and perform rich applications like games and services with Global Positioning Systems (GPS). Competing Operating System (OS) makers continue to spur technology innovations in efforts to capture larger market share or retain users. In July 2009, the two leading OS are iPhone OS and Symbian OS. Technologies such as touch screen, movement sensor and integrated Location Base Services (LBS) on these platforms have ramped up sales of smartphone. However, smartphone security concern remains paramount due to increasing attacks by cybercriminals. While users take precautionary steps to protect their laptops or desktops, not many smartphone users are aware of the risk from cyber attacks over their smartphone. So, smartphone users beware!

In Malaysia, the Blackberry is a widely-use smartphone in the corporate environment. Nevertheless, smartphones from Nokia and iPhone are becoming popular as well. Maxis was the first operator to introduce the Blackberry wireless solution in 2004, followed by Celcom and DiGi in 2006 and 2009 respectively. In 2009, Maxis launched iPhone 3G service, offering specially-designed postpaid plans for both 8GB and 16GB models. Globally, industry experts project the smartphone market to continually experience fast growth compared to the overall market for mobile phone, albeit from a small base, and upon consumer demand for Internet connection and rich applications on their mobile phones.

GREEN TELECOMS: A NEW FORCE MAKING A DIFFERENCE

The Changing Times

For a long time, the “green” movement was something that only the environmentalists worried in view of the depleting ozone layer affecting climate change. However, in today’s changing times, going green is no longer just an environmentalist concern but draws top level corporate attention within enterprises, organisations and industries around the world. More and more social and political forces are putting increasing pressure for the corporate society to play an active role in green initiatives. Global trends are increasingly on Corporate Social Responsibility (CSR) to green the environment. Thus, organisations are now striving to balance this role of taking into account the ecological impact of their businesses while preserving shareholder value in terms of profit generation.



Source: *Global Warming 101: Science*, GlobalWarming.org

Like others in this development, the telecommunications sector is also shifting to “greener” pasture and demonstrating deep concern over its business impact on global warming and related environmental issues. The reasons stem from its increasing energy consumption as well as the associated carbon footprint¹, making the telecommunications sector as potentially one of the biggest contributors to global warming.

The green agenda in general promulgates environmental sustainability, and the reduction of Green House Gases (GHG)

emission as the main objectives for going green. Hence, telecommunications sector green efforts and agenda can be seen from two angles - firstly from the view of *environmental benefits* and secondly, from the financial perspective of deriving *economic cost benefit* in the long term.

DO YOU KNOW?

Lighting an office overnight wastes enough energy to heat water for 1,000 cups of tea.

Source: *British Telecommunications plc (BT)*

For example, energy resources such as fossil fuel are limited and non-renewable, requiring the need for businesses including telecoms to adopt more energy efficient solutions in powering operations.

Specifically, in the current economic downturn, telcos are taking the stance of being both environmentally responsible, and striving to reduce cost. Though initial investment on producing and using more green telecommunications equipment and devices may be high but in the longer term, the returns are better. For example, the pressures of increasing cost of gasoline and petroleum worldwide take a toll on corporate spending as energy consumption is the leading driver for increasing operating expenses for both the fixed and mobile network service providers. Therefore, by going green through using alternative energy resources such as solar and wind power to power their base stations helps decrease the sector’s dependence on fossil fuel. Though solar-powered base stations may incur higher capital cost upon installation due to premium prices of green equipment, this cost can be recovered soon enough due to very low-maintenance requirements. This “tradeoff” offsets higher operating expenditures.

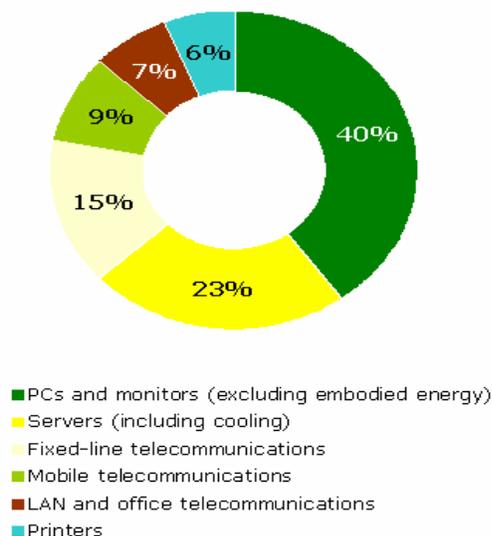
¹ *How green is your network? The Economist*, 4 December 2008

GREEN TELECOMS: A NEW FORCE MAKING A DIFFERENCE

In summary, the green movement not only contributes to more environmentally friendly operations, but also lower operating and capital expenditure for the telcos. The bottom line is green means cost savings.

Telecommunications Industry - Carbon Footprint Impact on the Environment

Estimated Distribution of Global CO₂ Emissions from ICT



Source: ITU and Climate Change, 2008

Telecommunication services like video conferencing have transformed how we work and play. This option allows for reduced need for travel which inevitably decreases energy consumption. Thus, telecoms can play a significant role as an enabler towards a carbon-lean economy.

Today, the ICT sector which consists of telecommunications, computing and Internet (excluding broadcasting transmitters and receivers) contributes about 2 to 2.5% of GHG emissions; equivalent to just under 1 Gigatonne of CO₂². According to Gartner, fixed and mobile telecommunication contributes an estimated 24% of the total global CO₂ emissions from ICT.

Looking further, according to a 2008 report, *SMART 2020 – Enabling the Low Carbon Economy in the Information Age* by Global e-Sustainability Initiative (GeSI)³, the global telecoms carbon footprint, contributed by telecoms devices and infrastructure has grown from 152 metrictonne carbon dioxide

equivalent (MtCO₂e) in 2002 to 300 MtCO₂e in 2007 and is expected to reach 349 MtCO₂e in 2020. The accelerating pace of growth of telecoms carbon footprint is a growing concern amongst the telcos, environmentalists, and governments alike.

DO YOU KNOW?

Downloading music can reduce CO₂ emissions by 0.42MtCO₂ per year from avoided CD manufacturing and shipping.

Source: World Economic Forum

Further breakdown for telecoms carbon footprint is shown in the table below:

Global Telecoms Carbon Footprint (Devices and Infrastructure) - MtCO₂e

		2002	2020	% of change
Telecoms Devices	IPTV boxes	0	11	-
	Broadband modems	2	18	800.0
	Mobile phones	16	22	37.5
TOTAL		18	51	183.3
Telecoms Infrastructure	Mobile networks	66	179	171.2
	Fixed narrowband	64	70	9.4
	Fixed broadband	4	49	1125.0
TOTAL		134	298	122.4

Source: SMART 2020 – Enabling the Low Carbon Economy in the Information Age by Global e-Sustainability Initiative (GeSI), 2008

² ITU and Climate Change, 2008

³ GeSI was established in 2001 to further sustainable development in the ICT sector. GeSI foster global and open cooperation, informs the public of its members' voluntary actions to improve their sustainability performance, and promotes technologies that foster sustainable development. GeSI brings together leading ICT companies including telecommunications, service providers and manufacturers as well as the industry associations and non-governmental organisations committed to achieving sustainability objective through innovative technology.

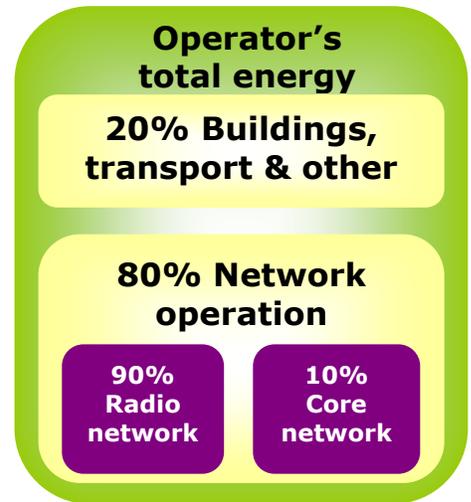
GREEN TELECOMS: A NEW FORCE MAKING A DIFFERENCE

According to Northstream⁴, the key contributor to GHG emissions is the powering of networks. Northstream estimates that 80% of a mobile service provider's total energy emissions is from network operations, with the remaining related to building, transport and other activities. For example, Vodafone estimates that their network account for 80% of its carbon footprint, with the remainder from its offices, shops and vehicles. About three quarters of the network contribution is from powering its base stations that allow mobile phones to connect to the network.⁵

Typically, a traditional cooling system contributes substantially to a telco's total network power consumption. Therefore to address energy efficiency, telcos need to relook at the efficiency of their networks, and take action accordingly at top management strategic level, in order to mitigate this.

Making Ringgit And Sense Of Green Telecommunications

In terms of spending and revenue, the Insight Research Corporation reported that the worldwide spending on green communications services is estimated to increase 34% between 2008 and 2013.



Source: Taking the temperature on green telecom, Northstream white paper, June 2009 by Northstream

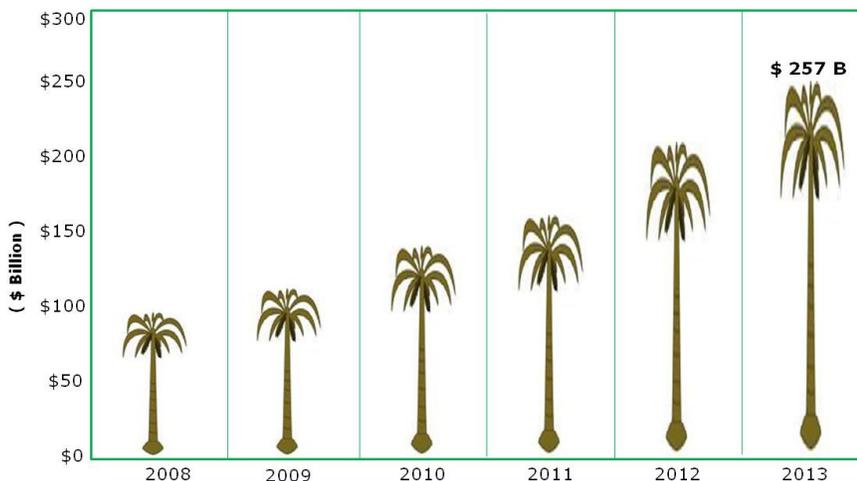
DO YOU KNOW?

A photocopier which is left switched on overnight needs the same amount of energy as it does to make 15,000 photocopies.

Source: T Systems Enterprise

Making Green Going Green

Global Green Communications Technologies Revenues 2008 - 2013



Source: Adapted from Insight Research Corporation (6/08), The Bridge 2008

Their findings also indicate that by 2013, green communications revenue is expected to reach USD257 billion (RM873.8 billion) or a quarter of the total global carriers' revenue. Additionally, the business sector will realise more than 30% of cost or power reductions, including product waste cost savings for commercial buildings between 50 - 90%.

Another recent report from Pike Research indicates that by 2013, environmentally friendly telecoms equipment will grow to represent 46% of the USD277 billion (RM941.8 billion) global telecoms infrastructure market.

⁴ Northstream is an experienced management consulting firm providing strategic business and technology advice to the global telecom and media industries

GREEN TELECOMS: A NEW FORCE MAKING A DIFFERENCE

When it comes to operating expenditure (Opex), Ovum estimates that power, which is a significant direct cost to telcos, currently accounts for between 2 – 3% of telcos operational spending. However, the levels vary significantly around the globe.⁶ In addition, in 2007, it is estimated that telcos electricity opex accounted for roughly USD8 billion (RM27.2 billion) in Europe, the Middle East and Africa (EMEA) and USD6 billion (RM20.4 billion) in the Asia-Pacific. Meanwhile, in Japan, it is estimated that routers alone would account for 97% of Japan's total electricity consumption by 2015⁷.

Practising What They Preach

It is reported that ICTs comprising telecommunications, computing and Internet (excluding broadcasting transmitters and receivers) which account for only around 2.5% of total green house emissions today, is an enabler to act as a catalyst and a driver in the transition to a low carbon economy. This is done through its increasing part played in controlling and reducing the other 97.5% CO₂ emissions caused by activities in other sectors.

As a result of the United Nation's Kyoto Protocol, it is reported that telcos in Canada, Europe and parts of Asia are ahead of their US counterparts in implementing initiatives to reduce CO₂ emissions.⁸

So how can telcos play a role towards contributing to a low carbon economy? A first step would be for the telcos to look into their own management framework. A recent report by a leading global management consulting company, Booz and Company assessed that a green framework for a telecommunications service provider would include both the supply and demand side initiatives in the value chain as shown here.

Green Framework Value Chain for Telecommunications Service Providers



Source: *Going Green – Addressing Untapped Consumer Potential in the Telecom Industry* by Booz & Co, 2008

⁵ *How green is your network, The Economist, 4 December 2008*

⁶ *Green concerns start impacting telecom sector but profit goals will drive action, Ovum.*

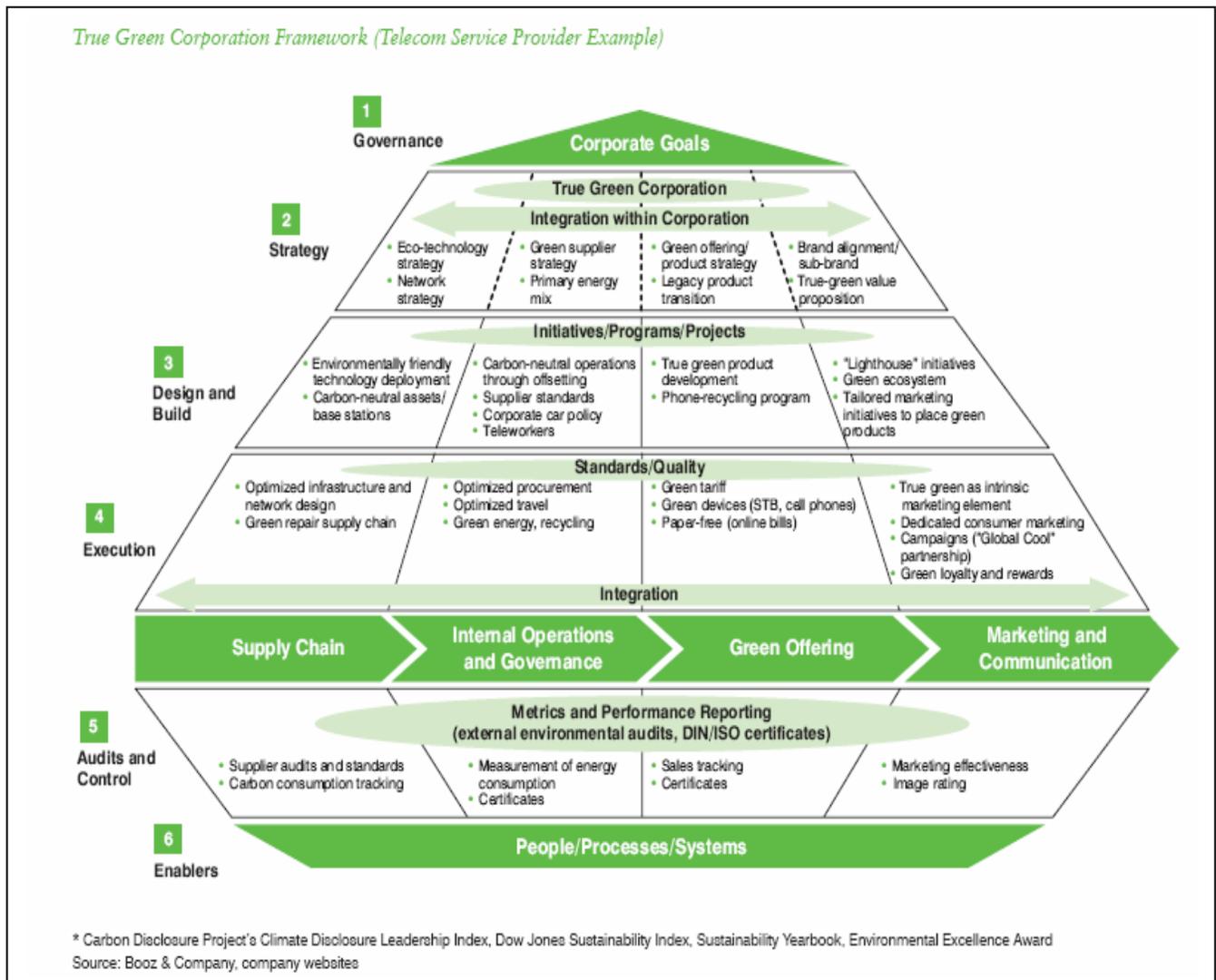
⁷ *Estimation by researchers from Japan's Advanced Industrial Science and Technology Institute (AIST).*

⁸ *Telecoms green future by Telephony Online, 18 June 2008*

GREEN TELECOMS: A NEW FORCE MAKING A DIFFERENCE

The diagram shown below is an example of a holistic green framework for a telecom service provider including the value chain.

The Telecom Service Provider Green Framework



Source: *Going Green – Addressing Untapped Consumer Potential in the Telecom Industry* by Booz & Co, 2008

Through this Green Framework, telecommunications service providers are able to ensure that each process is able to build a value proposition that will influence both internal and external activities to drive lower carbon emission. Yet, it is found that not all telecommunications service providers, including those in Malaysia have implemented such holistic green strategies in their framework. Only a few companies have taken initiative so far in their planning while implementation is, however, in selected parts of the value chain.

DO YOU KNOW?

100 million mobile phones are thrown away in Europe each year and on average mobile phone users replace their handsets every 18 months

Source: *Green Mobile Website*

The table below shows the companies which are among the encouraging examples to date where such initiatives are implemented through selected parts of the value chain to address green issues as a whole.

GREEN TELECOMS: A NEW FORCE MAKING A DIFFERENCE

Telecommunications Service Providers Green Activities

√ Areas of activity per operator	AT&T	British Telecom	China Mobile	Deutsche Telekom	Orange	Sprint	Swisscom	Telecom Italia	Telefonica	Telekom Austria	Telenor	Telia Sonera	Telstra	Telus	Verizon	Vodafone
ISO14001	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Low-emission car fleet	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Staff training	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Recycling program	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Renewable energies	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Teleconference / Teleworking	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Paperless office	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
e-Billing system	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Green awards and rankings*	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

* Carbon Disclosure Project's Climate Disclosure Leadership Index, Dow Jones Sustainability Index, Sustainability Yearbook, Environmental Excellence Award, Company Websites

Source: Going Green – Addressing Untapped Consumer Potential in the Telecoms Industry, by Booz & Co, 2008

Green Solutions from the Telecommunications Industry

For telcos, going green does not end at the internal operational management 'planning stage'. Some telcos started designing products that are environmentally friendly as well. Strategic level repositioning of business operation models and, in particular, the marketing of new green products and services have offered consumers a role also to start limiting the direct carbon emission from the telecommunications industry. Consumer can even buy green handsets, if they so choose or dispose off their old handsets to a recycling facility promoted by telcos or vendors. From handsets to computer applications, base stations to data centres, many telcos have started remarkable efforts to join in the effort to make Planet Earth a better place to live in today and for generations to come.

The tables below show a variety of green initiatives in telecoms hardware and software such as greener mobile phones and more energy efficient data centres.

Mobile Phones and Phones – Green Initiatives



Samsung Reclaim⁹

Mobile phone makers such as Nokia, Sony Ericsson, Samsung and Motorola have come up with 'greener' mobile phones which are not only attractive but are made from recycled materials and bio-degradable plastics. With nearly 4.1 billion mobile phone users worldwide, these "bio-degradable" phones contribute their own way towards worldwide conservation efforts.

Noteworthy is that an increasing number of new phones are bought by consumers. While this means there are also more old mobile phones being discarded, recycling efforts safeguard the green agenda.

⁹ Samsung Reclaim is the first phone in US where its casing is made with 40% corn-based plastic material which is 100% biodegradable. It is free of phthalates, polyvinyl chloride and brominated flame retardants that have high level of toxicity. It is also built with a charger that lights up, indicating that the battery is fully charged, so you don't have to over plug it and use up energy. Source: Eco-friendly tips, <http://ecofriendlytip.com>

GREEN TELECOMS: A NEW FORCE MAKING A DIFFERENCE

For example, Nokia Evolve 3110 (see picture) is made of 50% renewable materials and comes with a box made of 60% recycled materials. Sony Ericsson also announced their eco-friendly charger which shuts down when the phone is fully charged, so it will produce no energy wastage during the charging process.



Nokia Evolve 3110

DO YOU KNOW?

CO₂ released at high altitudes contributes between two to four times more to global warming than the same volume released at ground level.
Source: British Telecommunications plc (BT)

Siemens has OpenStage IP phones, which are energy-efficient and utilises an ultra-low power state that reduces power consumption up to 60% when the device is idle.

Siemen OpenStage 60 VoIP



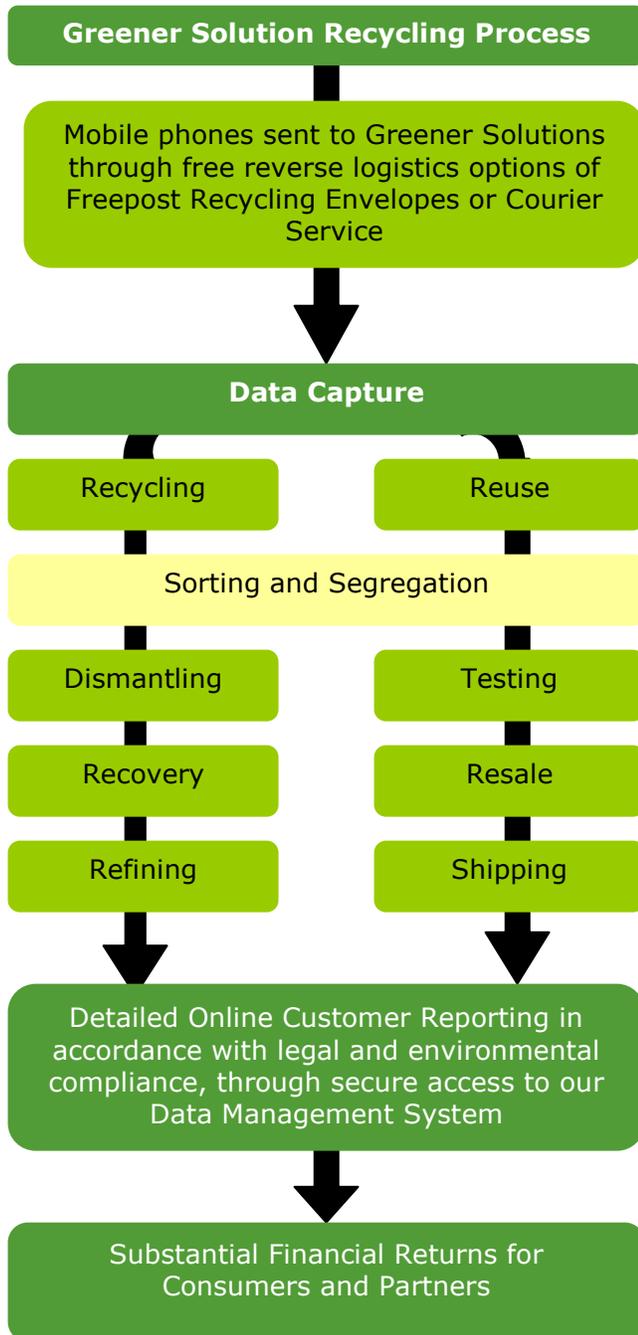
Source: Nokia ,Samsung, Siemens

Recycling as a Greener Solution

While greener mobile phones are being manufactured by handset makers, users as individuals also have a responsibility to reduce the amount of waste they produced such as old mobile phones. And recycling of mobile phones is one of the best green efforts and solution to continuously have a positive impact on the environment. For example, a successful recycling programme such as the Mobile Phone Recycling Scheme by Greener Solution¹⁰ in UK help users and telecommunications service providers to do their bit and support the environment and ensure that today's technology does not become tomorrow's problem.

¹⁰ Greener Solution is a dynamic and innovative company in UK focusing on the reuse and recycling of end of life mobile phones.

GREEN TELECOMS: A NEW FORCE MAKING A DIFFERENCE



The following chart shows the process for Greener Solution's Mobile Phone Recycling Scheme.

In this scheme, for each mobile phone return by users, Greener Solution pays a flat and transparent fee per mobile, irrelevant of its make, model or age. The flat fee can then be passed through to a chosen charity or act as a customer incentive.

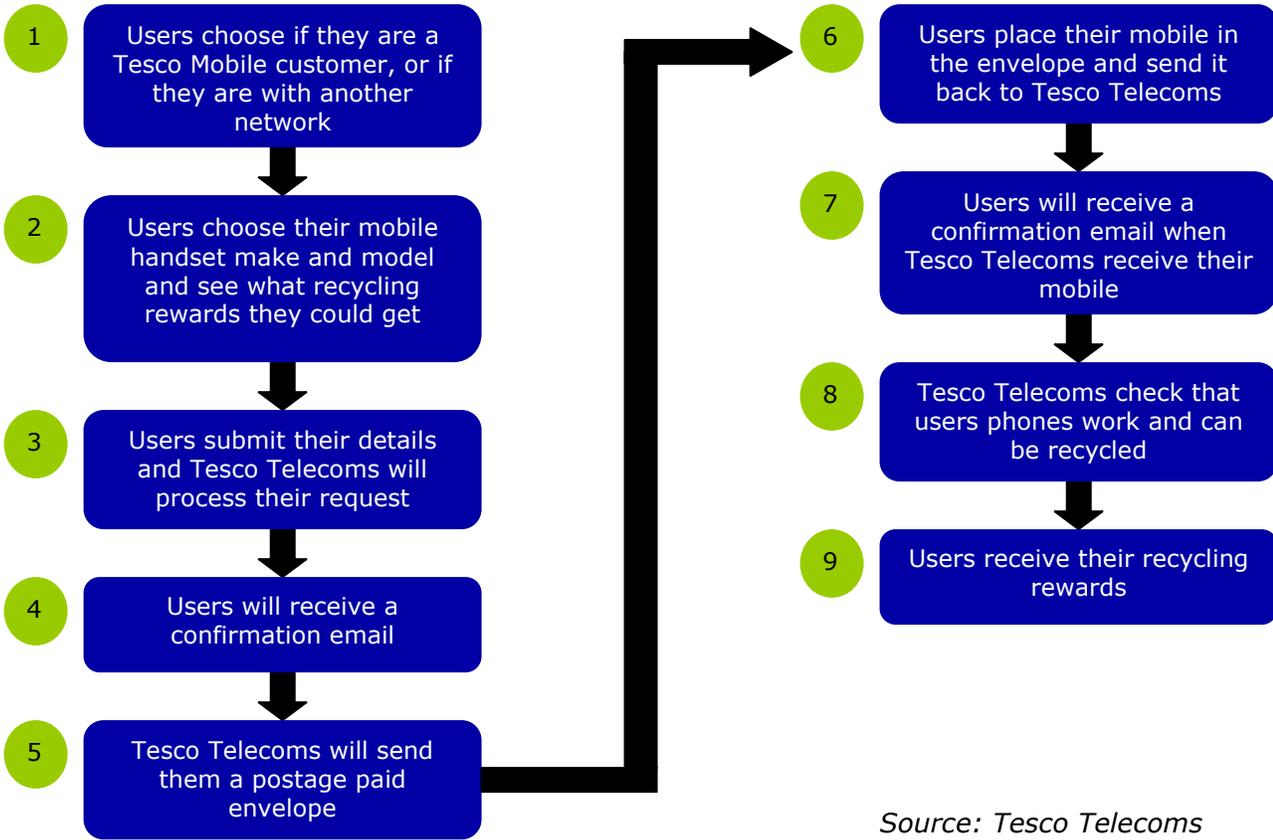
For its recycling partners such as telecommunications service providers or even retailers who utilise their branded prepaid or pre-addressed recycling envelopes or via bulk pick up with their courier service, Greener Solution provides cost-free logistics.

For example, Tesco Telecoms in UK is offering mobile phones recycling services in partnership with Green Solution. By participating in this programme, users can either earn Tesco Clubcard points or choose to donate to a participating charity organisation and receive mobile airtime or giftcard rewards.

Source: Greener Solutions

GREEN TELECOMS: A NEW FORCE MAKING A DIFFERENCE

The following is an example of Tesco Telecoms mobile recycling programme with Greener Solution:



Source: Tesco Telecoms



GREENER solutions The environmental answer for a Mobile world
www.greener-solutions.com

Example of Tesco Telecoms Postage Paid Envelope by Green Solutions for its Mobile Phone Recycling Programme

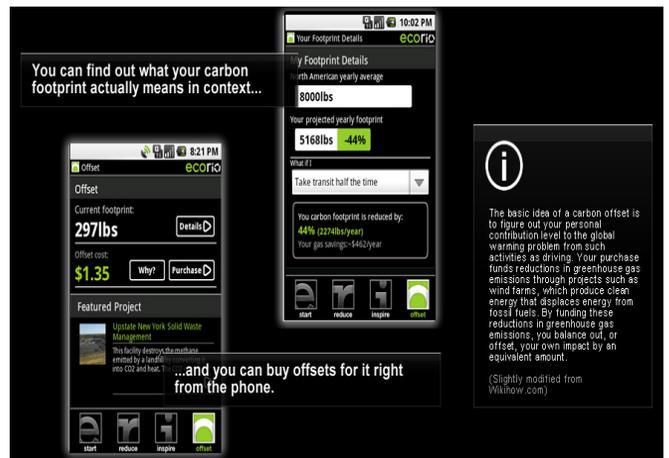
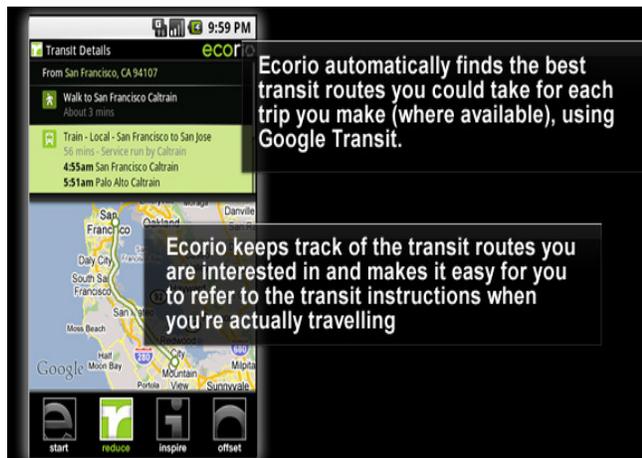
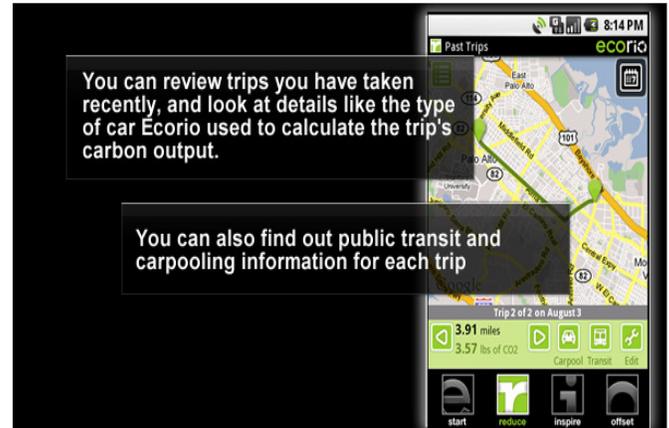


GREEN TELECOMS: A NEW FORCE MAKING A DIFFERENCE

Mobile Applications – Greener Lifestyle

Application developers are also in the green lifestyle movement. An application like Ecorio, launched with the HTC G1, is one of the innovations by mobile device application developers to increase awareness and assist users to keep track of the carbon footprint they produce through everyday travels. In addition to that, Ecorio offers consult as to the best method to get to a destination with the least impact on the environment.

Ecorio Applications



Source: Ecorio, <http://www.ecorio.org>

GreenDrive by Road-Guard



Source: NaviGadget.com

GreenDrive, an award-winning application developed by Road-Guard, works with Nokia smartphones or GPS receivers. It can also do green calibration and navigation. The application shows the most efficient way for drivers to travel to a location and generate optimal vehicle speed leading to average fuel savings of 15-25%¹¹. This is besides giving tips to assist drivers to drive in an ecologically responsible way.

GREEN TELECOMS: A NEW FORCE MAKING A DIFFERENCE

Batteries and Chargers – Greening to Save Materials and Energy

According to GreenBatteries¹², there are approximately 15 billion batteries produced and sold around the world every year. Many of them are alkaline batteries; discarded after a single use. Many of us throw away used batteries without noticing how harmful those batteries are to our planet if they are not recycled properly. Thus today, many telcos are not only opting for the use of Lithium-ion (Li-ion) rechargeable battery because they are more environmentally friendly, but because they also save cost. Some telcos assert extra effort to recall old batteries so that users do not discard their old batteries inappropriately.

In March 2009, HP Malaysia launched a programme called 'Live Green with HP Recycling Promo' to recall their own old batteries for recycling purposes. The promotion was held for two months in conjunction with HP conservation efforts, starting with HP Notebook.



Lately, the GSM Association announced an initiative relating to green chargers. This initiative received backing from 17 mobile carriers and manufacturers such as LG, Motorola, Nokia, Samsung, Sony and Ericsson. The purpose is to create a universal phone charger by 2012 that is designed to be energy efficient. It is estimated that a universal charging solution can reduce standby energy consumption by 50% and can eliminate up to 51,000 tonnes of duplicate chargers.

Personal Computers – Green Efforts

In today's world, 'PC' is no longer a technology jargon, but instead to most of us, it has now become a necessity. Offices provide desktops to their employees while some are comfortable carrying laptops or lately, netbooks, everywhere in the name of convenience. Without realising this, it has resulted in increased carbon footprint.

DO YOU KNOW?

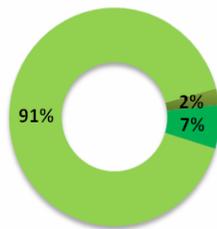
18% of office workers never switched off their PC at night or weekends, and a further 13% leave it on some nights each week producing about 700,000 tonnes of CO² emissions.

Source: World Economic Forum

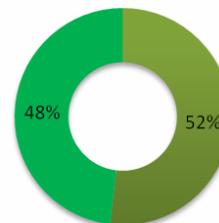
A study by GeSI in 2002 found that both the PCs and monitors combined footprint was 200MtCO₂e and is expected to grow three times to 600MtCO₂e by 2020 – which is equivalent to 5% growth rate per annum. Many PC makers are now aware of the carbon footprint produced by PC and are starting to produce more energy-efficient and more earth-friendly PCs for the mass market.

Composition of the PC Footprint

2002 (100 % = 247 Million Tonnes CO₂e)



2020 (100 % = 643 Million Tonnes CO₂e)



2% - Laptops (6MtCO₂e)

7% - Desktops with LCD monitors (16MtCO₂e)

91% - Desktops with CRT monitors (226MtCO₂e)

48% - Desktops with LCD monitors (309MtCO₂e)

52% - Laptops (333MtCO₂e)

** Desktops with CRT monitors (0MtCO₂e)

Source: SMART 2020 – Enabling the Low Carbon Economy in the Information Age by Global e-Sustainability Initiative (GeSI), 2008

GREEN TELECOMS: A NEW FORCE MAKING A DIFFERENCE

Tips on How to Green a PC

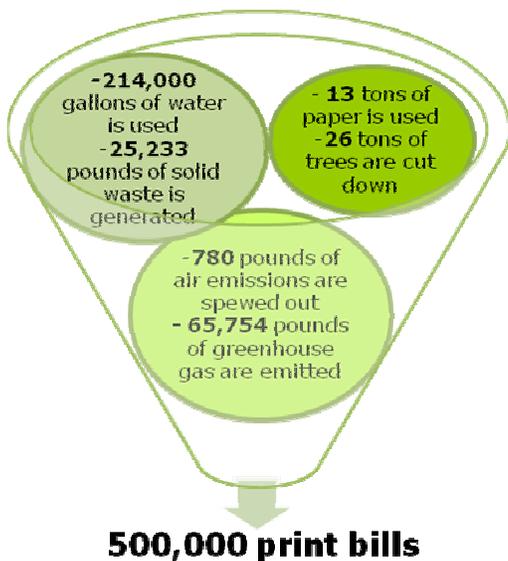
- Recycle old PCs. PCs contain hazardous materials that can harm environment and human health if not dispose properly.
- Buy computers from manufactures that use less hazardous materials and components.
- Choose computers that use less energy or have ENERGY STAR¹³ qualification.
- Practise good computer usage. Turn into standby or sleep mode when not in use to save energy.
- Purchase computers equipment and components that use less energy. LCD monitors are more energy-efficient than CRT monitors. Laptops use less energy than desktop in general as well.

Source: *How to Green a PC* (www.ehow.com), greenspark.com



Example of 'green monitor':
The Dell G2210 22' Green Monitor –
It emits no radiation and uses much less energy.

Dematerialisation Through E-Billing



Source: *eBilling news on Striata findings*

Another way for telcos to minimise the environmental impact is through supporting dematerialisation initiatives or reducing the use of physical resources. One way to achieve this is through e-billing. Striata, a global e-billing specialist, calculated that for every 500,000 bills printed, the extent of environmental damage in terms of wastage and emissions is huge. (see picture).

E-billing can assist in reducing paper output, billing cost while complying with green regulations and earth conservation efforts. Businesses can also save money when using e-billing as it eliminates the need to produce and distribute the materials involved. In addition to this is the eradication of fuel cost needed to transport the bills, reduced amount of dedicated workers required to deliver the billing statement and remove postage cost which is also increasing.

DO YOU KNOW?

By early January 2007, Apple had sold over 2 million songs via iTunes Store, equivalent to approximately 166 million CDs. When stacked one on top of each other, this pile of CDs would reach over 1,000 miles high. If a standard tractor trailer can move 36 tonnes of product or about 605,000 CDs, Apple iTunes store has saved about 275 tractor trailers worth of CDs from being manufactured and shipped; and is adding to that by about five tractor trailers per week.

Source: *World Economic Forum*

In US, Javelin Strategy & Research revealed that if Americans pay their bills online, it would reduce solid waste in landfills by more than 800,000 tonnes a year and reduce GHG emissions by 2.1 million tonnes. Therefore, online services clearly contribute to save trees and our planet.

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Base Stations – Greening the Network



Ericsson Tower Tube with Wind Turbine
Source: Ericsson

Another challenge for telecom companies is how to power up their base stations for optimal use while reducing carbon emission. For example, Ericsson has developed green technologies that reduce CO₂ emissions of base stations. One feature is its Base Transceiver Station Power Savings¹⁴. When installed in GSM base stations, it can reduce CO₂ emissions by one million tonnes per year, equivalent to emissions from 330,000 cars each travelling 16,000km per year¹⁵.



Prototype of wind-powered Tower Tube in Uppsala, Sweden
Source: Ericsson

Another technology is its Tower Tube, a concrete tower that has lower environmental impact than traditional steel ones, and requiring up to 40% less power from a lifecycle perspective¹⁶. Additionally, thanks to technology advancement and research on renewable energy and resources today, telecom companies now have several alternatives for powering their base stations.

DO YOU KNOW?

36kg of CO₂ is used to make one 90g phone

Source: Green Mobile Website

Motorola in a white paper 'Alternatives for Powering Telecommunications Base Stations', showed under normal conditions, there are alternative energy resources that can provide excess electricity for base stations.

An overview of Wind, Solar, Fuel Cell and Pico Hydro Technologies available for telecommunications industry is shown below.

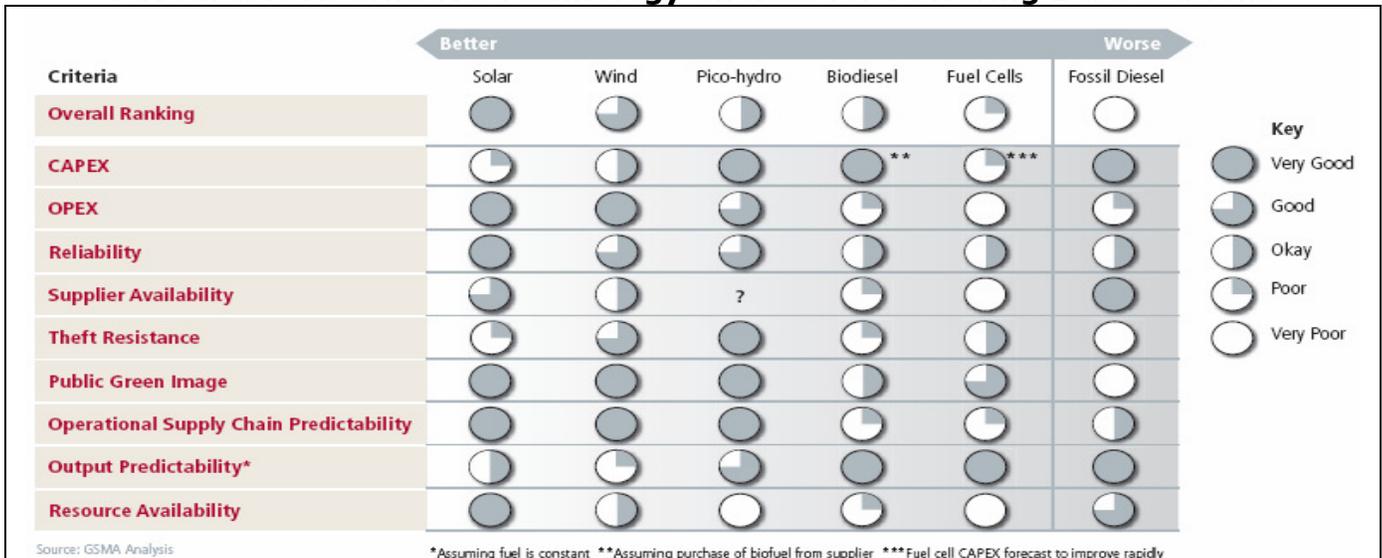
Alternative Energies to Power Base Stations

Ideal Setting	Benefits	Issues	State of the Industry
<i>Wind</i>			
<ul style="list-style-type: none"> - Coastal locations or hilly areas - Wind speeds of 4mph - 30mph, averaging at least 8 mph across a 4 hour period 	<ul style="list-style-type: none"> - Minimal OPEX and efficient for DC generation - Small footprint 	<ul style="list-style-type: none"> - Cost per kW produced currently higher than Solar or Diesel - Minimum wind speed ~4-6 mph needed 	Commercial installations available for domestic applications and for specific technology applications, particularly in remote areas such as Artic and UK Hebridean islands
<i>Solar(Photo- Voltaic or PV)</i>			
<ul style="list-style-type: none"> - Areas with long/good sunlight ~ 6-8 hours/day - Space available for the array 	<ul style="list-style-type: none"> - Minimal OPEX - Cheaper than turbines for same KW output, expecting further price reduction 	Cost higher than diesel, array can be a target for vandalism of theft	Fairly mature, commercial installations. 3rd generation PV may offer significant cost savings.
<i>Fuel Cell</i>			
<ul style="list-style-type: none"> - Access to atmosphere for oxygen and water vapor output - Protected from very low temperatures 	<ul style="list-style-type: none"> - Energy efficiency - Fuel flexibility 	<ul style="list-style-type: none"> - Hydrogen fuel source availability and storage - Cost - Maturity of alternatives to Hydrogen 	Commercial systems proven and available
<i>Pico Hydro</i>			
High rainfall, hilly terrain	Not as susceptible to short weather conditions	Requires specific water flow conditions (e.g. river with a gradient)	Small, localized applications

Source: Motorola White Paper: Alternatives for Powering Telecommunications Base Stations, 2007

GREEN TELECOMS: A NEW FORCE MAKING A DIFFERENCE

Favourable Alternative Technology Choices for Powering Base Stations



Source: Green Power for Mobile: Top Ten Findings by GSMA

Green Data Centres

Although data centres are beneficial to organisations and enterprises, they now poses a major problem in terms of energy consumption for their cooling needs. A report by HP states that a typical 20,000 square-foot enterprise data centre at 100watt per square foot has a peak cooling demand that is comparable to a 200,000 square-foot commercial building, and total annual energy consumption comparable to that of a 400,000 square-foot office building.¹⁷

Evidently, the major trend that drives the overall increase in carbon footprint is data centres. According to GeSI, in 2002 the global data centre footprint was 76MtCO₂e and this number is expected to jump to 259MtCO₂e by 2020, making it the fastest-growing contributor of carbon footprint in the ICT sector. The expected 7% growing rate per annum hopefully can be further reduced if telecommunications companies adopt effective virtualisation architectures in storage system for data centres. Therefore, it is persuasive for companies to use low energy cooling systems which ultimately reduce energy consumption.

Teleworking and Teleconferencing for Green Miles

While teleworking and teleconferencing are known to save time, there are also potential carbon emissions to be saved from it. With advances in telecommunications technologies, it can contribute significantly to their success. Services like IP telephony, unified communications (UC) and high speed broadband enable employees to execute their work from home offices or in remote locations.

For example, using UC enables employees to work from home while reducing CO₂ emissions as it cuts down employees commute to the office. Using UC also means using fewer machines to deliver the same output and half the energy required as compared to any premise-based system.¹⁸ Also less office space required means savings from rental. In Japan, tax breaks are provided to companies that offer teleworking to employees. Similarly in Thailand, the Fiscal Policy Office in the government Finance Ministry, allows staff to work from home one day per week.¹⁹

GREEN TELECOMS: A NEW FORCE MAKING A DIFFERENCE

Green Broadband in Communications

In the telecommunications industry, broadband has been touted as the next technology to greening the economy. To many of us, broadband means connected services that translate to reach of community and speed, with the potential to spur economic growth. Broadband not only creates job opportunities and increased revenue streams for service providers, but also equates to green growth.

DO YOU KNOW?

One passenger flying on a typical 250-seat passenger jet will generate one pound of CO₂ every two miles. Thus for a flight across United States which is about 3,000 miles, a passenger contributes to 1,500 pounds of CO₂ which will require 30 trees to offset the CO₂ emission.

Source: *Trees for the Future*

Having said that, not many are aware that broadband network is in fact a green enabled technology that has the potential to cut back on energy usage and mitigate CO₂ emission. For example, in light of today's economic downturn, companies are cutting back on business travel and reducing budget for it. With broadband enabled technologies that support video and Voice over Internet Protocol (VoIP), broadband applications and services will become alternative means to business travel while at the same time lessening carbon footprint through conveniences of telecommuting and teleconferencing.

Malaysian Mobile Service Provider Strategies

Within the telecommunications arena, DiGi.Com Bhd (DiGi) offers a Malaysian example of a service provider that is an active advocate of going green. DiGi Deep Green initiative launched in 2008 is proving effective in contributing to environmental sustainability. Currently, DiGi generates 130,000 tonnes of CO₂ annually. The company aims to reduce emission by 50% to 70,000 tonnes by 2011²⁰ through energy efficiency frameworks and creating enhanced awareness on climate change among employees, customers and the community. Committing investment of RM100million in its Deep Green agenda, DiGi is on the way to meeting its target. So far, the company reports savings of 600% on demolition costs and more than RM4 million in opex savings through greening its network.²¹ DiGi holistic strategies include the following:

DiGi Deep Green Strategies

Customers	
Billing	Encourage e-billing for postpaid customers - this online statement method saves trees and cost, including more efficient and timely billing. This applies to DiGi employees too.
Customer service	Provides online customer service where customers check their account and information through DiGi website instead of driving to DiGi centres - cuts down on CO ₂ emission.
Employees	
Car pooling	DiGi initiated car pooling among employees on 30 July 2008. Car poolers enjoy added benefits such as preferential parking bays and free parking privileges.
Shuttle service	DiGi provides free shuttle bus service for employees to key train stations to cut down on the CO ₂ emission and encourage the use of public transportation.
Energy Conservation	DiGi encourages energy conservation among employees. Its Building Maintenance Automation System regulates air conditioning and lighting during peak and off-peak times. Energy saving bulbs are used extensively in the office.
Waste management and recycling facilities	To encourage recycling, DiGi introduced recycling bins in the office. Styrofoam cups and plastic bags were replaced with porcelain mugs and recyclable paper bags. According to DiGi, they saved on 420,000 styrofoam cups.
Network and IT	
Network	For more energy-efficient network, DiGi uses equipment that needs less energy to maintain, and reduce air-conditioning to cool base stations.
Procurement	DiGi persistently convinces suppliers to meet Supplier Code of Principles such as its "green procurement" criterion for sourcing exercise above RM500,000. This criterion

GREEN TELECOMS: A NEW FORCE MAKING A DIFFERENCE

carries 20% evaluation weightage.

Community

Awareness DiGi community engagement creates awareness among the public, especially youths on environmental issues; activates and empowers them towards sustainable lifestyle options based on its Deep Green Community Model.

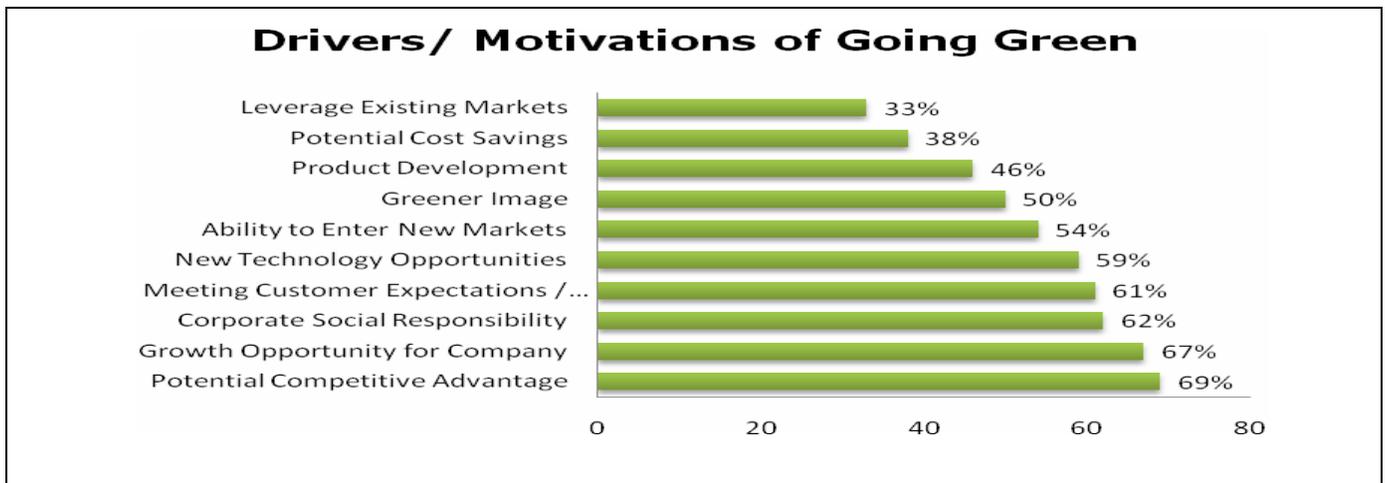
Source: DiGi Deep Green Website, <http://www.digi.com.my/deepgreen/index.html> , DiGi to Halve Carbon Emissions, The Star newspaper, 23 August 2008 and Telco Makes its Procurement Process Eco-Friendly but That is Only the Beginning, The Edge, 27 April 2009

Companies like Nokia in Malaysia have long ago initiated the green drive, with introduction of automated mobile phone recycling kiosks across central Klang Valley in Malaysia. According to Nokia, up to 80% of any Nokia device is recyclable. Through recycling, it prevents used mobile phones from cluttering up landfills with hazardous materials and toxic chemicals.

Other international initiatives and programmes on green telecoms by various agencies and organisations include those by GSMA, ITU and TIA. Overseas telecom companies such as Vodafone, Verizon, Nokia Siemens, and France Telecom are also on the bandwagon for a more sustainable environment. Examples of such initiatives and programmes are at Appendix 1.

Conclusion - Going Green for Survival of Generations to Come

According to Frost & Sullivan, there are various different motivations for companies to go green. Their study shows that organisational leaders are polarised in their perception of going green – it is viewed as either a moral or ethical obligation, or an advantage for growth.



Source: Frost & Sullivan, Going Green Survey, 30 September 2008

GREEN TELECOMS: A NEW FORCE MAKING A DIFFERENCE

DO YOU KNOW?

Mobile phone contains numerous toxic elements, like arsenic, beryllium and lead, which risk being disposed of in landfills, if not recycled properly.

Source: Northstream

For many, and especially telcos, going green is not only a wake-up call to green efforts on protecting our planet, but it is also a business advantage and a strong selling point. Consumers, aware of climate changes, are increasingly embracing and have appealed for earth-friendly products and services. For reasons of survival of the planet, a sustainable environment for our generations to come, and even

accelerating business performance, the telecommunications industry is working towards building ICT infrastructures that are more environmentally friendly; enabling users to play, work and live without impacting the environment negatively.

However, it is obvious that while at this, the telecommunications industry requires a more systematic and standardised measurement of energy efficiency. Such guidelines would help companies, small and big, measure rates of success and the extent of mitigation to effectively reduce their GHG emissions while keeping business as usual.

SMARTPHONE – OFFERING PROMISES OF RICH APPLICATIONS

Introduction

Effectively, a smartphone is purposed to provide users the better of the two worlds of voice service and “computer” capabilities in a handset. To put it simply, it is a mobile phone with PDA (Personal Digital Assistant) functionality. A smartphone differs from a normal mobile phone in that it has a distinct software operating system and local storage, so users can add and store information, send and receive e-mail, and install programmes to the phone such as music and video applications, web browsing and GPS apart from chat, note-taking and media playback. In contrast, regular phones only support sandboxed applications (like Java games).

According to Symbian, smartphones differ from ordinary mobile phones in two fundamental ways. First, how they are built, and the second is what they can do. Various definitions put different stresses on these two factors. Typically, smartphones carry higher selling prices and apparently better profitability than basic phones. This reflects some degree to which they can replace and consolidate several discrete devices.

Historical Trend of Smartphones in the Market

1992	First smartphone called “Simon” was designed by IBM.
1993	“Simon” was released to the public and sold by Bellsouth
1996	Nokia released the first model of smartphone, Nokia 9000 and was known as Nokia Communicator.
1999	First BlackBerry was released
2001	First BlackBerry with integrated mobile telephony was released
2002	Treo cellphone used the Palm OS for organiser applications and offered e-mail and Web browsing.
2007	Apple released and sold iPhone to the public. Nokia Internet services, Ovi, was announced.
2008	Android, a cross platform OS for smartphones was released.
2008	Apple released the iPhone 3G
2009	Apple released its upgrade of iPhone 3G, which is the iPhone 3GS

Source: Various websites

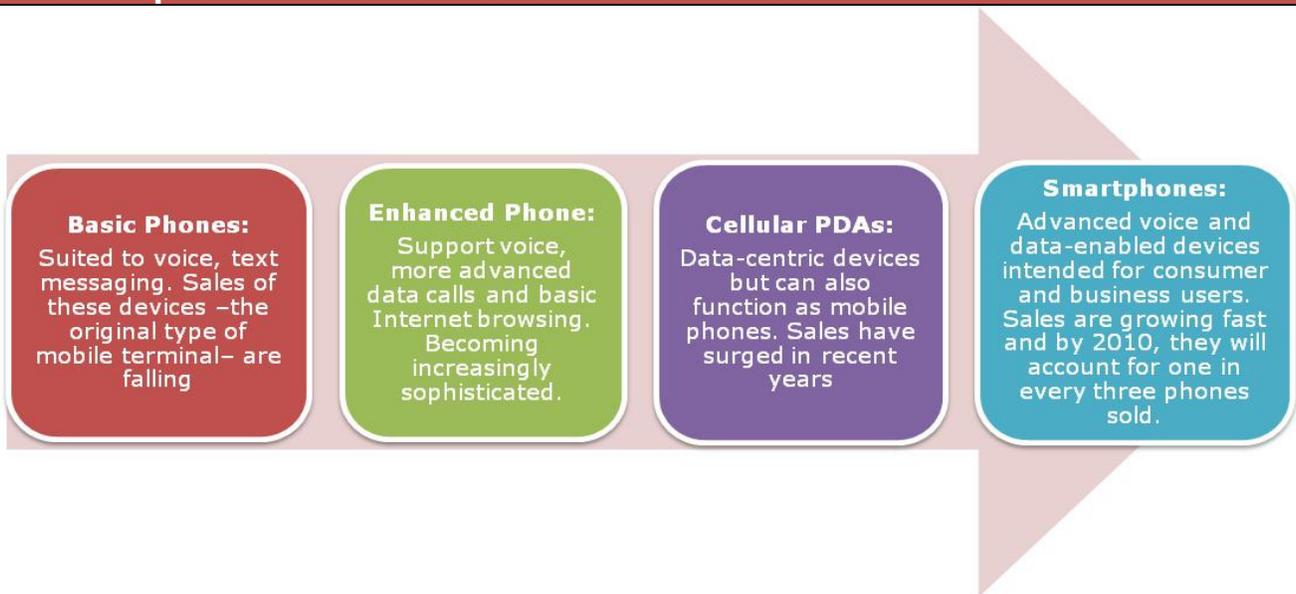
Main Market Trends Emerging In 2008



Source: Global Mobile Device Market in 2008, ROA Group White Paper, January, 2008

SMARTPHONE – OFFERING PROMISES OF RICH APPLICATIONS

How Smartphone Differs from other Mobile Devices



Source: Adapted from *Key Issues for Mobile Devices*, Gartner

Key Smartphone Features

Operating systems

- Based on an operating system that allows it to run productivity applications. BlackBerry smartphones run the BlackBerry OS, while other devices run the Palm OS, Symbian OS or Windows Mobile and some other OS. There are also smartphone OS that are pared-down versions of desktop Linux.

Software

- Allow users to create and edit Microsoft Office documents, or at least view files. Also to download applications, such as personal and business finance managers, edit photos, get driving directions via GPS, and create a playlist of digital tunes.

Web Access

- More smartphones can access the Web at higher speeds via 3G data networks and have WiFi enablement.

QWERTY Keyboard

- Most smartphones include a QWERTY keyboard. This means that the keys are laid out in the same manner they would be on the computer keyboard - not in alphabetical order on top of a numeric keypad, where users have to tap the number 1 to enter an A, B, or C. The keyboard can be hardware (physical keys that type with) or software (using touch screen).

Messaging

- All cell phones can send and receive text messages, but what sets a smartphone apart is its handling of e-mail. A smartphone can sync with users personal--and, sometimes, professional--e-mail account. Some smartphones can support multiple e-mail accounts. Others include access to the popular instant messaging services, like AOL's AIM and Yahoo! Messenger.

Source: http://smartphones.about.com/od/smartphonebasics/a/what_is_smart.htm

SMARTPHONE – OFFERING PROMISES OF RICH APPLICATIONS

Smartphone Applications

The changing applications and services requirements from end-users are the main drivers in smartphone development. Although the main service targets to provide the basic and main applications which offer convenience and simplicity, it is expected that differentiation and variation of services will expand the maximum capacity of a smartphone. Currently, some music specialised smartphones can look much like an MP3, with one-touch buttons for playing music, for example, Nokia N91 and Sony Ericsson W900i. Other smartphones in the market offer the functionality of a digital camera or video camera complete with high graphic resolution, ranging from 3.2Megapixel up to 8.0Megapixel (N93i and Samsung i8510 Innov8).



Sony Ericsson w900i



Nokia N93i

Applications base can be divided into three categories of industrial applications; professional applications; and entertainment and home applications.

Industrial Applications

Industrial applications interface is used to perform machine-to-machine (M2M) communications. Document viewing, location positioning, and monitoring and reporting are some of the most used industrial applications. Document viewing for instance, is one of the most essential functions where documentation can be downloaded and correctly formatted for viewing in the "limited" displays of smartphones. Positioning and navigation is already in use in transportation to guide drivers to the desired location. This technology has been available for years in the smartphone industry. Today, such technology has moved with end user demand from buying a separate car positioning kit towards the trend of taking the 'map' onto their palm. According to Canalys research, shipments of smartphones with built-in GPS overtake the PNDs market in EMEA. In the last two years, not all smartphones have GPS receiver integrated, but the target today is to have GPS built in all smartphones.

Professional Applications

For business purposes, the main professional applications are in the table below.

Professional Applications

- Personal information manager such as address book and personal diary applications
- Office applications such as text editing, spreadsheet calculation and slideshow presentation (Microsoft word, PowerPoint and Excel) are now with limited editing possibility. However, steps are being taken for further advances.
- Voice over Internet Protocol (VoIP) is increasingly gaining prominence. Further improvement in this technology is surely valuable to smartphone users since Yahoo Messenger and Skype have become increasingly popular among the generation Y and Z²² as a means to stay connected with their friends.
- Email has long been used in smartphones such as in Nokia Communicator and RIM Blackberry and the expectation is for more advancement in the coming years.

Source: Various websites

SMARTPHONE – OFFERING PROMISES OF RICH APPLICATIONS

Entertainment and Home Applications

Applications for entertainment and home are usually main attractions for a consumer to buy a smartphone. Applications include Music, video streaming, TV, smart remote controllers, games, Internet browsing, VoIP, chatting and electronic payment or transactions.

All manufacturers have special models for focused group consumers. To be as competitive as possible, smartphones not only need good interfaces, but also good commercial services for downloads and of course, high capacity storage. Synchronisation with PC or entertainment devices is beneficial such as for easy review or transfer to desired end platform or devices. It is important to have compatibility and interoperability between smartphones and home electronics devices. Such optimum capability will obviously offer people a wider choice to carry smartphones which offer both cellular-based voice and Internet connection with PC-like functionality.

According to Handango Yardstick first quarter 2009 review, games applications take the lead in software demand for smartphones. In early 2008, a Handango study finding indicated most smartphone owners are likely to use their smartphones as mini-entertainment centres in addition to the traditional day-to-day business functions.



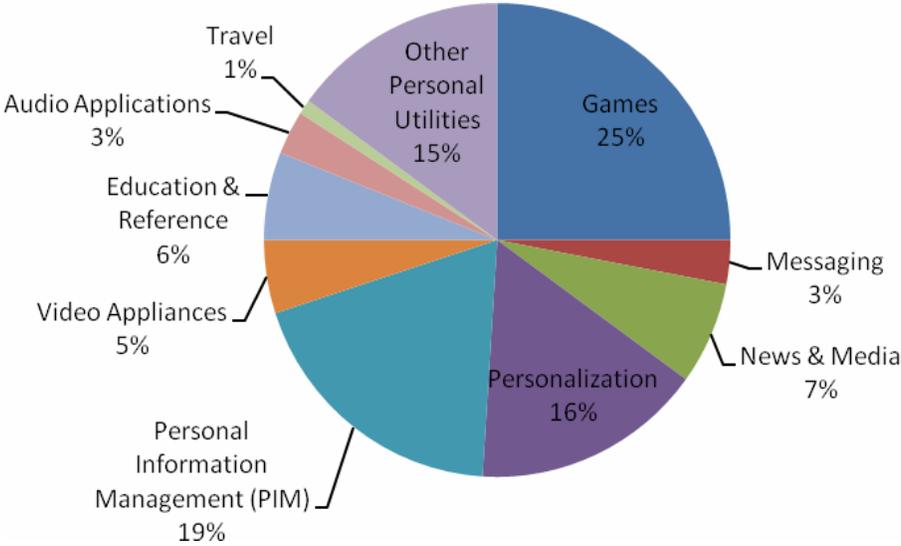
Prince of Persia game on BlackBerry

Source: Techshout.com

Hence, the general industry views that more targeted applications are expected to survive the applications competition as end users are more selective nowadays. In the pie chart below showing software sales by category, it is indicated that aside from games (at 25%), the "personalisation" or "personal"-related applications make up in total 50% of software sales (that is personalisation at 16%; PIM at 19% and other personal utilities at 15%.)

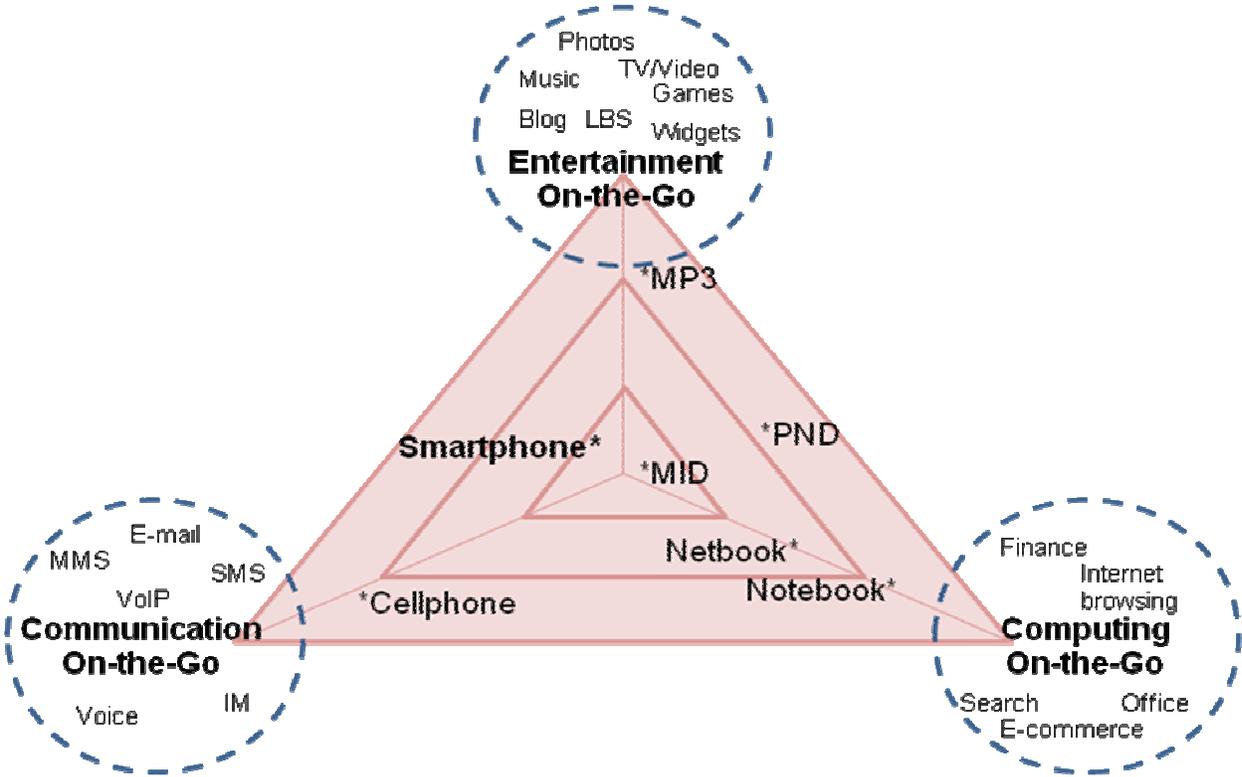
SMARTPHONE – OFFERING PROMISES OF RICH APPLICATIONS

Top Smartphones Adding Software Sales by Category



Source: First Half 2009 Handango Yardstick Review, 2009

Main Consumer Requirements for Mobile Internet Applications : Smartphone Positioning versus other Mobile Devices



Source: Adapted from In-Stat's Mobile Internet Calls for Open Devices- A China Perspective, Nov 2008

SMARTPHONE – OFFERING PROMISES OF RICH APPLICATIONS

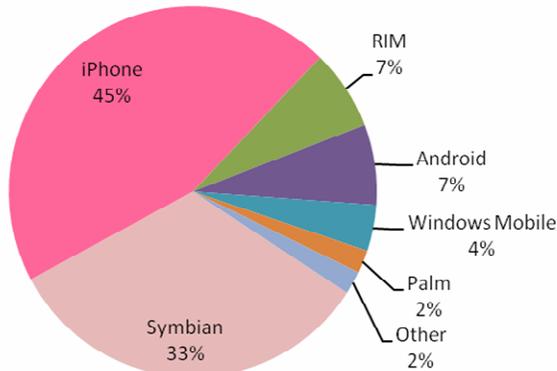
Operating Systems (OS)

Given the value-added versatility of the smartphone, it is invariable that the most important part of the smartphone is its operating system (OS). As the key element, OS development is expected to in the future allow us to carry not just our small smartphones but innovative rich applications service type smartphones, sufficient even to perform a wider range of Internet-based tasks.

In terms of “variety” or “brand”, the smartphone OS in the market now include the OS of Symbian, iPhone, RIM BlackBerry, Windows Mobile, ,Linux, Hiptop and the newly launched Android and Palm webOS. Each has their respective versatilityes or capabilities that tie it to the “brand”.

Presently, the trend of OS on smartphones can be seen as iPhone versus other OS. At end of fourth quarter 2008, AdMob²³ research on OS market showed that Symbian was still at the top of the list, with 41% share of the global smartphone OS. However in July 2009, AdMob reported that Symbian was no longer the leading OS in the market. The lead was taken by iPhone OS with 45% of worldwide market. This change may be due to a few reasons. According to Gartner, services and applications have become the primary drivers of smartphone success. iPhone OS, backed by strong sales of iPhone 3G and the latest edition iPhone 3GS, are seen to offer revolutionary functions in the smartphone market to the many eyes of end-users. The change in market share is also caused by a more competitive and fragmented OS market. Early September 2009, Palm introduced a new OS named webOS with Palm Pre the first to use it.

Worldwide Smartphone Requests by Operating System as at July 2009

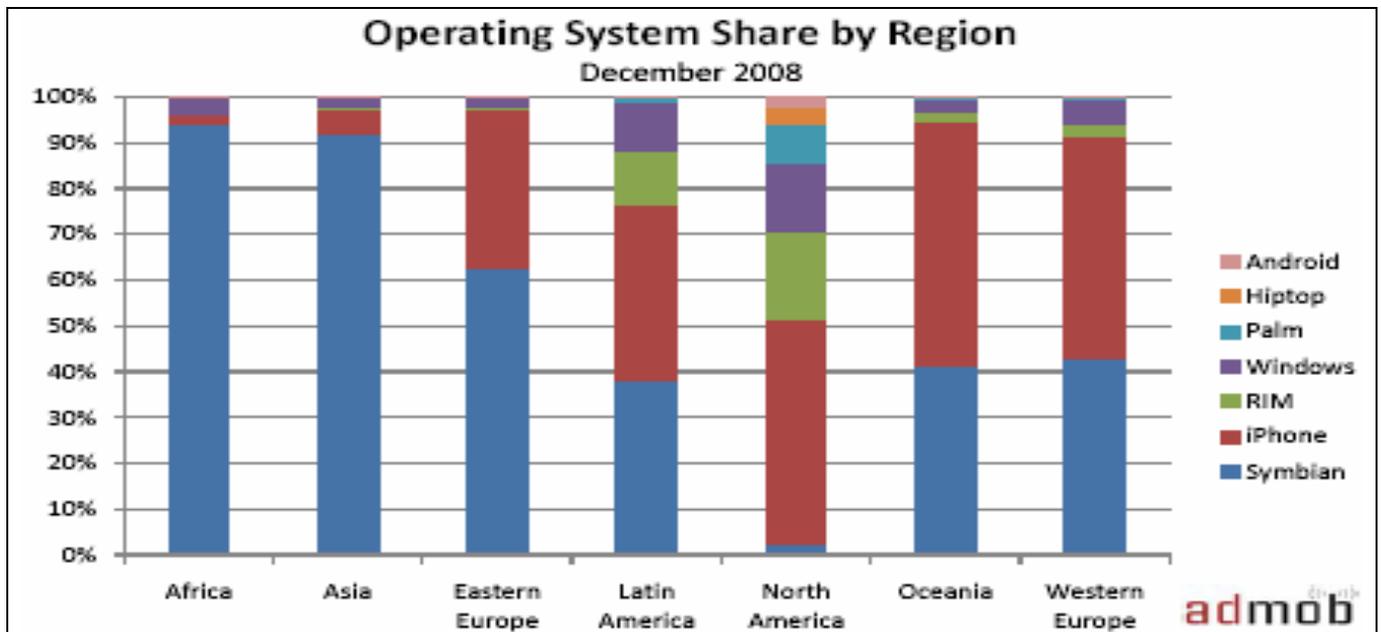


**Percentage share refers only to requests from smartphones
Source: AdMob Mobile Metrics Report, July 2009*

WebOS lets developers use standard web languages such as CSS, XHTML and JavaScript; and also Palm ensures that developers can develop their platform to offer easier and faster experiences than before. More OS are expected to emerge in the coming years.

Further development on operating system is likely to trend in terms of similarity to each other with differentiated elements for various target groups.

SMARTPHONE – OFFERING PROMISES OF RICH APPLICATIONS



Source: AdMob Mobile Metrics Report, December 2008

One example of the flexibility provided by the new versions of operating systems is the Nokia E61 which looks almost like a PDA but operates on Symbian OS.²⁴

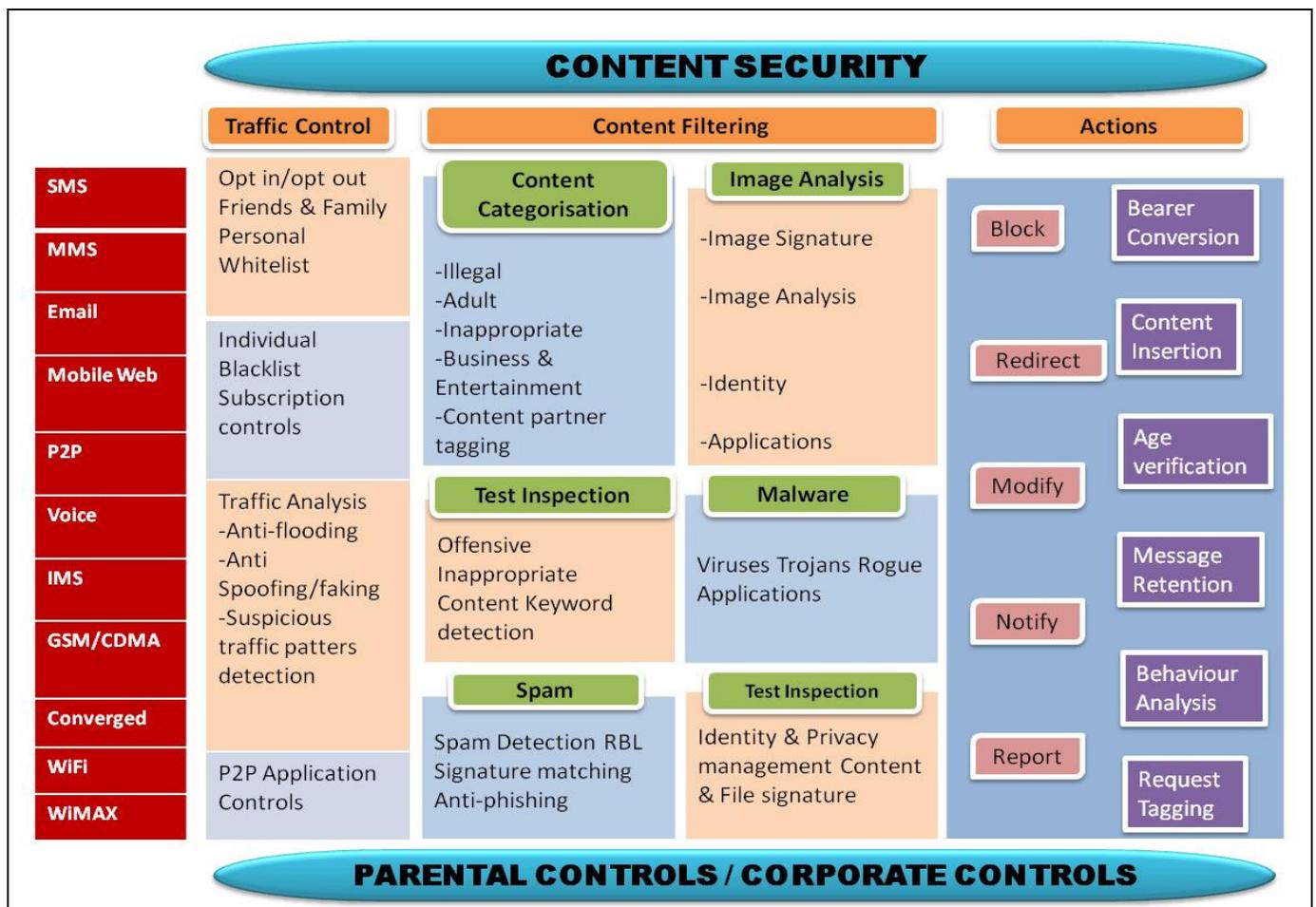
Another development is OS to become an open-source OS. Android has become the first service-oriented smartphone operating system where its functions are wholly network-based. This open-source OS is free of non-recurring engineering (NRE) and all functions are open to any application developer where intellectual property (IP) protection is provided to all third-party applications. Juniper Research findings indicated that OS and applications are playing an increasingly important role in the differentiation of new smartphones. They predicted that the number of smartphones shipped with open source OS will increase from 106 million units in 2009 to 223 million units by 2014. Such developments are expected to further drive applications innovation in the smartphone applications environment.

Risk and Security Issues

Security is greatly emphasised in all applications in smartphones because the information in them is usually valuable and private. As the mobile markets develop and more of the population gets connected, there is an increased demand and mandate for security such as messaging security for MMS, SMS, and e-mail; and mobile web filtering to block illegal or inappropriate content. There is also more demand for anti-fraud and other requirements to enforce and report on compliance in corporate portals as well as control in the home and education context of parental or teacher control of Internet usage by children and students respectively.

An example of elements in parental and corporate controls on content which covers various services from SMS to wireless broadband including monitoring and action taken are shown in the table below.

SMARTPHONE – OFFERING PROMISES OF RICH APPLICATIONS



Source: Adaptive Mobile Security Ltd 2007, <http://www.adaptive-mobile.com/products/article/0/16>

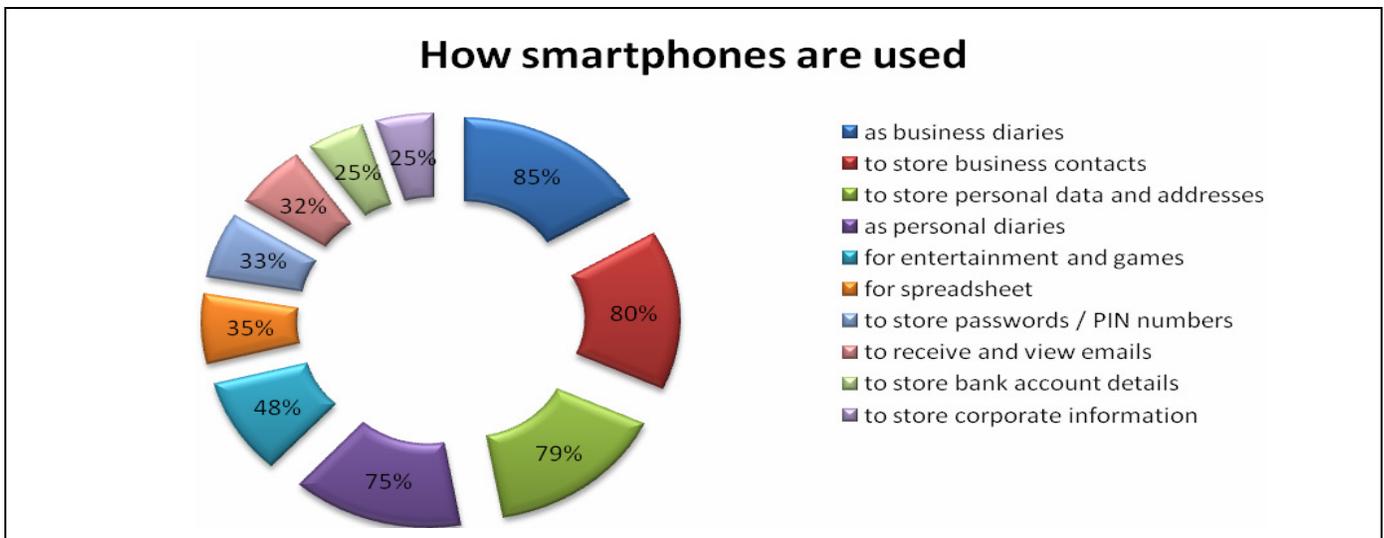
Security risks related to the inherent characteristics of smartphones

Security including privacy requires exactly the same approach as in personal computers, for example virus scanners, firewalls, and encryption of memory, storage and data transmitted. Smartphones come equipped with a dedicated operating system and thus are prone to new risks such as bugs and holes, mainly due to the complex architecture of these operating systems. Smartphones with increased sophistication and capability to host content also make them more worth it to steal.

Security risks related to the users

The figure below shows there is a high percentage of use of smartphones to store confidential personal information. The users, however, may not necessarily be aware of the risks of such loss of information which their smartphones pose. Data stored on the device or on the external memory chip can easily become accessible to a third party whether by theft of the device or illegal connection. Consequences can equate to identity theft or the leakage of invaluable confidential and private information.

SMARTPHONE – OFFERING PROMISES OF RICH APPLICATIONS



Source: Adapted from Pointsec Mobile Technologies – Mobile Usage Survey, 2004

Security risks related to wireless networks

Connectivity of smartphones to various sources of networks may present risks due to the inherent nature of the wireless medium over the 2.5, 3 or 3.5G networks. The risk faced by a smartphone user when a smartphone is connected to the browsing web or information system is similar to when connected to the Internet through a modem directly to the LAN.

Smartphones can be vulnerable to threats like phishing, sniffing, spoofing, man-in-the-middle and many more. In order to diminish the related risks, smartphone owners need to educate themselves such as by reading the instructions on use or working with service providers concerned on necessary precautions or compliance requirements when performing real-time activities involving personal information such as mobile banking and payments. Cisco²⁵ and F-secure²⁶ have released warning that high-end smartphones may be the next target for cybercriminals. According to Cisco, text messages scams have also escalated in frequency since early 2009 with at least two or three campaigns each week²⁷. The move from closed environments towards open-source OS is generally an enhancement of current context but does make smartphones more attractive targets for misuse or abuse by tricksters and criminals.

With the growing number of threats targeting smartphone and the rising concern over mobile malware, security companies have released more security products for smartphone. One of the many security products available for smartphone users is from Kaspersky, a security software company. One of these is the recently launched Mobile Security 8.0 that is packed with wide security solution that can protect smartphone against loss and stealing while safeguarding smartphone privacy data from cybercriminals.

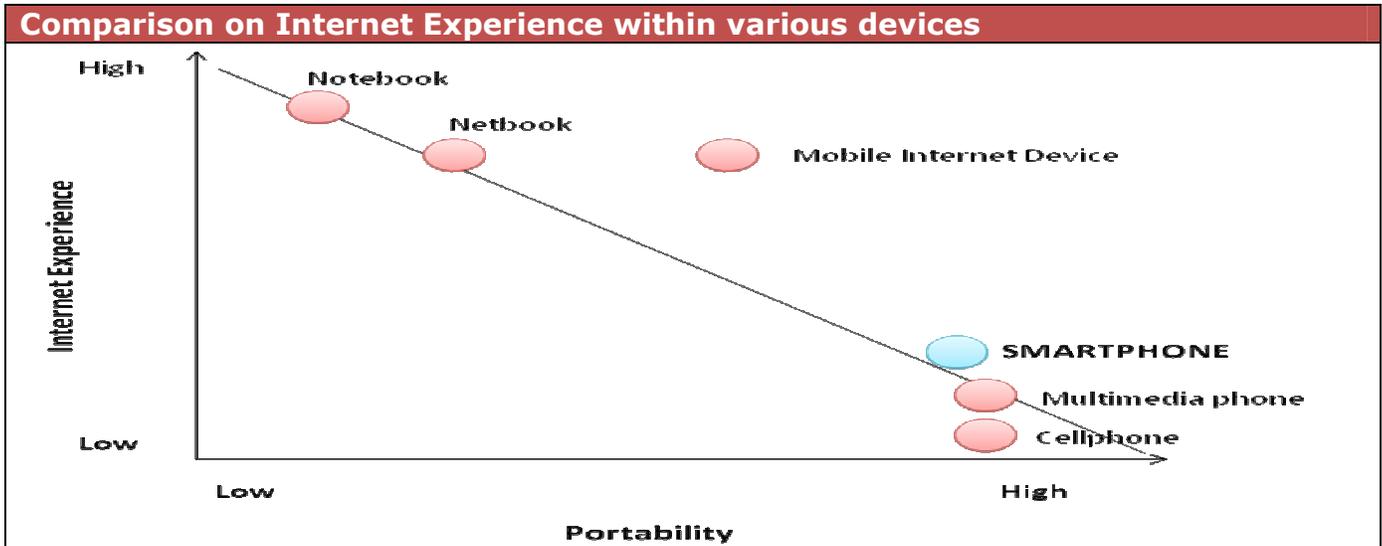


Limitations to Smartphone Adoption

One of the biggest attractions of smartphones is the ability to access the Internet without having to find a computer. Although some smartphones currently feature Internet browsing, they do not as yet provide a complete Internet experience as a PC due to limitations in screen size, data processing capability, and operability. For some consumers,

SMARTPHONE – OFFERING PROMISES OF RICH APPLICATIONS

Internet is the most important media, and users want to be able to surf anywhere and anytime. Internet on-the-go has potential to be commonplace, thanks to the smartphone. Even better, many smartphone models are now equipped with Wi-Fi, which provides users access to the Internet anywhere they can find a hotspot without having to purchase a special data plan.



Source: *Mobile Internet Calls for Open Devices – A China Perspective, Nov 2008*

In terms of cost, smartphones do not as yet come cheap - ranging from RM1,500 to as much as more than RM3,000 per unit. Another limitation on a handset right now is that it is not easy to move from one application to the other compared to when on a desktop computer. Problem also arises for workers who input large amounts of information. For example, a user who writes long reports on the road will still want a laptop, and users who read long reports on the road are another story. A Nielsen Norman Group study recently indicated that mobile web users have 35%²⁸ less success completing website tasks on cell phones than they do on a PC. This compares to an average success rate of 80% for websites accessed on a regular PC. Obstacles to better browsing on the handset are reported to include awkward input, download delays, and badly designed websites.

In the past, the hardware requirements of smartphone operating systems have made smartphones more expensive, heavier by weight and have higher power consumption than feature phones with similar functionality. Nevertheless, smartphone operating systems are being optimised to need less memory and processor power as well as improvement in hardware. These invariably work to closing the cost and size gap between smartphones and advanced feature phones.

Smartphones compete in the mobile computing space with other devices such as the notebook, netbook and mobile Internet devices (MID). Compared to these devices, smartphones limitations today include small screen size; capability of data processing; and access to Internet content.

SMARTPHONE – OFFERING PROMISES OF RICH APPLICATIONS

Comparison of Notebook, Netbook, MID & Smartphone

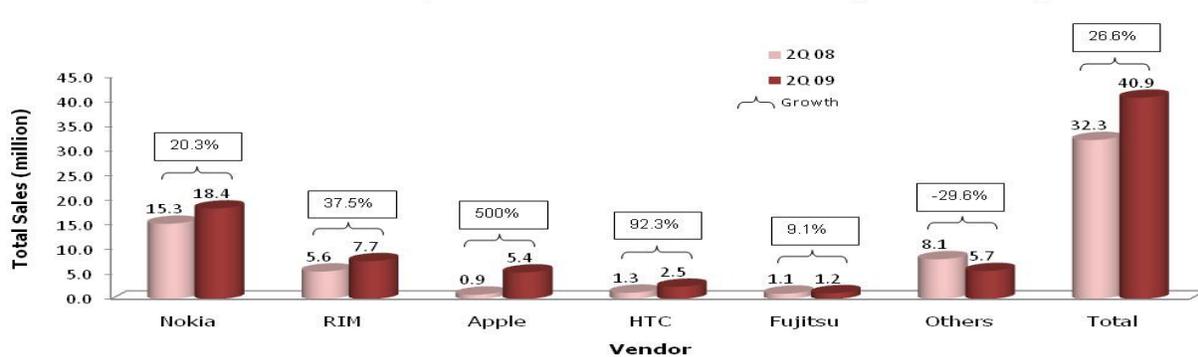
	Notebook	Netbook	MID	Smartphone
Portability	Low 10-15 inch screen	Medium 6-10 inch screen	High 4-7 inch screen wearable	Very High 2-3 inch screen, wearable
Capability of Data Processing	High	Medium	Medium	Low
Access to Internet Content	High	High	High	Medium

Source: Adapted from In-Stat's Mobile Internet Calls for Open Devices- A China Perspective, Nov 2008

Smartphone Market Size - Worldwide Sales by Vendors

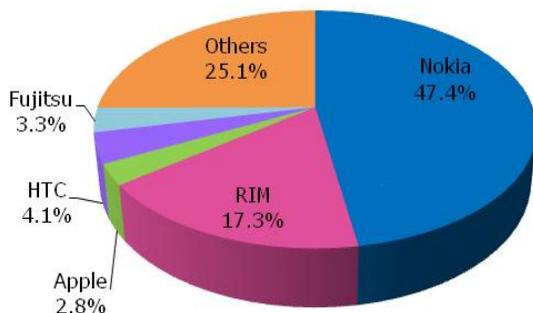
Worldwide mobile phone sales totaled 286 million units in the second quarter of 2009, a 6.1% decrease from the second quarter of 2008 at 305 million units. Noteworthy is that of all mobile device sales, smartphones market share increased to 27% from the same period last year at 11%.

Worldwide: Smartphone Sales to End Users by Vendor 2Q09

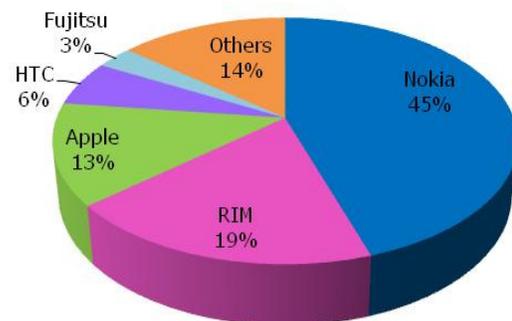


Source: Gartner Press Release, Aug 2009

Smartphone Market Share 2Q08



Smartphone Market Share 2Q09



Source: Gartner Press Release, Aug 2009

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Top Five Mobile Phone Vendors for 1Q 2009		
Market Share	Global Rank	Remarks
Nokia 38.1%	1	<ul style="list-style-type: none"> Shipped 93.2 million handsets worldwide in 1Q 2009, down 19% from 115.5 million units in 1Q 2008. With 38% global market share, Nokia lost 3% share versus the quarter a year ago due to weak shipments across five of its six major regions.
Samsung 18.8%	2	<ul style="list-style-type: none"> Shipped 45.8 million handsets worldwide in 1Q 2009, down 1% from 46.3 million units in 1Q 2008; 13% from 52.8 million in last quarter. Global market share at 19%, with operating margin of 12% in 1Q 2009. Samsung continued its assault on smartphone market by unveiling an Android-powered smartphone, the I7500; launched in June 2009. Samsung is first of the big 5 global brands to announce an Android handset; providing tough competition for Android leader, HTC of Taiwan.
LG 9.2%	3	<ul style="list-style-type: none"> Shipped 22.6 million handsets worldwide in 1Q 2009, down 7% from 24.4 million units in 1Q 2008. Market share at 9% of global handset business and continued to solidify its third place in the industry. LG's operating profit improved to 7% during the quarter, although it is still below double-digit margins from early 2008.
Motorola 6.0%	4	<ul style="list-style-type: none"> Shipped 14.7 million handsets worldwide in 1Q 2009, down a sizeable 46% annually. Its operating loss reached USD0.5 billion (<i>RM1.7 billion</i>).
Sony Ericsson 5.9%	5	<ul style="list-style-type: none"> Sold 14.5 million handsets worldwide in 1Q 2009, increase around 40% from 24.2 million units in 4Q 2008.

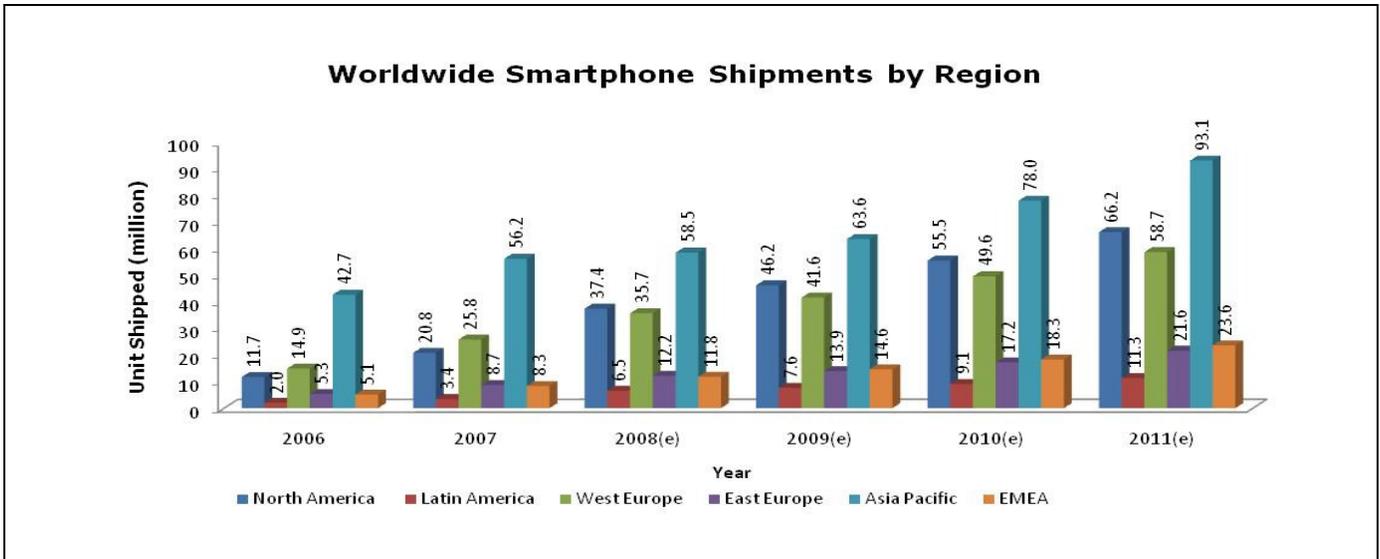
Source: Gartner Inc.

Smartphone Market Size - Worldwide Smartphone Shipments

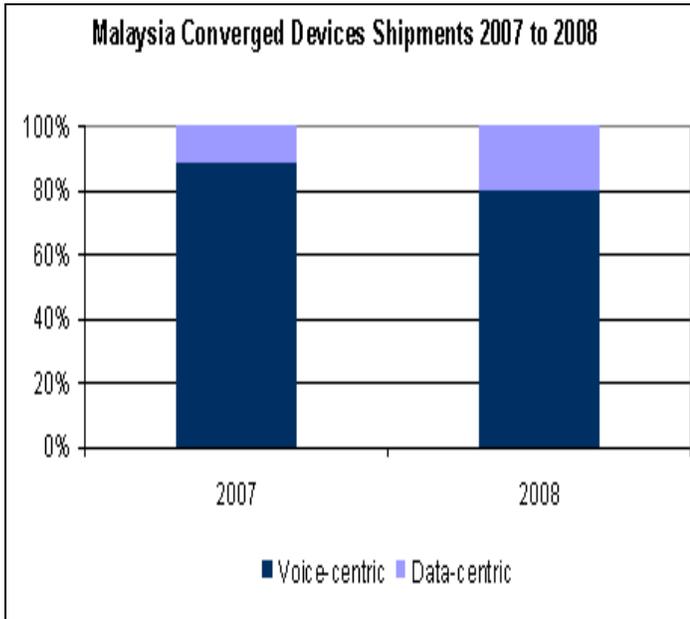
In 2006, the highest amount on smartphone shipments was to the Asia Pacific at 42.7 million units. This was followed by West Europe, North America and East Europe at 14.9 million units, 11.7 million units and 5.3 million units respectively. The fifth place was then held by EMEA, with 5.1 million units. Latin America smartphone shipment is at 2 million units so far. The observed spread of smartphone shipments remain much the same as in the year 2007.

In 2008 until 2011, the consensus prediction among Oppenheimer & Co., IDC, and Gartner is that the Asia Pacific still holds strong smartphone shipments compared to North America and Western Europe. Observation is that although there is some increase in the number of smartphone shipments, Latin America is still the smallest among these six regions.

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Source: *Announcing A Strategic Alliance, Garmin-Asus, Feb 2009*



Smartphone Sales in Malaysia

In 4Q 2008, sales of smartphones in Malaysia dropped by 3% compared to 4Q 2007. However, shipments for the full year 2008 grew slightly to reach 1.2 million units.

Data-centric smartphones grew 80% year-on-year, while voice-centric declined by 9%.

While in terms of smartphones shipped to Malaysia in 2008, 21% was data-centric as compared to 12% in 2007. The launch of new models by Nokia, HTC and RIM generates growing awareness and demand for data-centric smartphones. IDC expects this segment to become more competitive in 2009, with Apple and Acer entering the Malaysian mobile market²⁹.

*Converged devices refers to smartphones

Source: <http://www.cellular-news.com/story/37294.php>

BlackBerry And iPhone – An Overview

BlackBerry

The BlackBerry is a wireless handheld device introduced in 1999 that makes it easy for users to stay connected while on the go. The BlackBerry provides seamless connectivity to the intranet or Internet, supports push email, mobile telephone, text messaging, Internet faxing, web browsing and other wireless information services. Developed by the Canadian company Research In Motion, it delivers information over wireless data networks of mobile services provider companies. BlackBerry first made headway in the market place by concentrating on email.

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TWO TYPES OF BLACKBERRY SERVICES

TYPES	DESCRIPTION
BlackBerry Enterprise Solution	Enables wireless extension of corporate email and applications
BlackBerry Internet Service	Wireless messaging solution for small enterprises and individual users, enabling simplified wireless connectivity to publicly accessible messaging and collaboration systems.

Source: *Developing Applications for BlackBerry Devices: An Introduction for Mobile Application Developers*, Research In Motion Limited

BlackBerry in Malaysia

In Malaysia, with the collaboration between Maxis and RIM, Maxis is the first operator to introduce the BlackBerry wireless solution in 2004 and has continued to introduce new BlackBerry smartphone models to the market as shown in the table below. The other mobile service providers Celcom and DiGi started their BlackBerry services in 2006 and 2009 respectively.

List of BlackBerry in Malaysia by Mobile Provider

BlackBerry Model	Mobile Provider		
	Maxis	Celcom	DiGi
Curve 8520	√	√	√
Storm	√	√	-
Bold 9000	√	√	√
Curve 8900	√	√	√
Curve 8310	√	√	-
Pearl 8100	√	√	-
8707v	√	√	-
8300	√	-	-
Pearl 8110	√	-	-
Pearl Flip 8220	√	-	-
8800	√	-	-
8820	√	-	-
8700g	√	-	-
8707g	√	-	-
7130g	√	-	-
7100g	√	-	-
7290	√	-	-
8320	√	-	-

Source: <http://worldwide.blackberry.com/landing.jsp?regionId=22&providerID>

iPhone



The iPhone was introduced in the United States in mid-2007. It is Apple's first Internet-enabled smartphone, combining the features of a mobile phone, wireless Internet device, and iPod into one package. The iPhone runs a version of Apple Mac OS X operating system. This is also compatible with Microsoft's Windows operating systems, including Vista.

A year later in July 2008, the iPhone was extended by the iPhone 3G. The iPhone 3G added higher data speed, GPS and an application platform that allows ultra-mobile, general-purpose "computing".

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In Malaysia, Maxis was the first service provider to launch the iPhone 3G in March 2009. Maxis offers the 8GB and 16GB iPhone 3G models with four new and specially designed postpaid plans called iValue, all of which are voice-data bundled price plans, starting from RM100 per month. For customers who sign up for a monthly commitment of RM375 over a 24-month period on the iValue 4 plan, the iPhone 3G 8GB will be free of charge.³⁰

Further, the iPhone 3GS has improved performance with more megapixels camera and video capability, and voice control. It was released in the US, Canada, Australia, Japan and six European countries in June 2009. In Malaysia, the iPhone 3GS was launched in July 2009, four months later than the iPhone 3G.

2009 Smartphone Product Comparisons

There are some similarities and differences between smartphones in terms of operating systems, for example, BlackBerry uses its own operating systems known as BlackBerry Handheld Software. While other smartphones use other types of operating systems such as Palm OS, Android, or Windows Mobile.

In terms of features, most smartphones support full featured email capabilities with the functionality of a complete personal organiser. Other functionality might include an additional interface such as a miniature QWERTY keyboard, a touch screen or a D-pad, a built-in camera, Internet browsers or secure access to company e-mail. One common feature to the majority of the smartphones is a contact list able to store as many contacts as the available memory permits, in contrast to regular phones that have a limit to the maximum number of contacts that can be stored.

The table on Top 10 Best-Selling Smartphone in US Market for Second Quarter 2009 provides similarities and differences in terms of features between these smartphones. With the memory of 128MB and 512 MHz processor, BlackBerry Curve becomes the first in the top rank. This BlackBerry Curve 8900 is using BlackBerry Handheld Software as its operating systems. Apple iPhone 3GS comes next, and followed by BlackBerry Pearl, Apple iPhone 3G, BlackBerry Bold, BlackBerry Storm, T-Mobile G1, Palm Pre, HTC Touch Pro and finally HTC Touch Diamond. Each of these smartphones has their own advantages in meeting the requirements and consumer satisfaction. Relating to Malaysia, the BlackBerry Curve 8900 is the latest BlackBerry model released by Maxis and Celcom in February 2009.

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TOP 10 BEST-SELLING SMARTPHONE IN US MARKET 2Q 2009										
Model	BlackBerry Curve 8900	Apple iPhone 3GS	BlackBerry Pearl	Apple iPhone 3G	BlackBerry Bold	BlackBerry Storm	T-Mobile G1	Palm Pre	HTC Touch Pro	HTC Touch Diamond
										
Memory	256MB	32GB	128MB	8/16GB	128MB	128MB	192MB	8GB	288MB	256MB
Bluetooth	√	√	√	√	√	√	√	√	√	√
Input Method	QWERTY keyboard, trackball	QWERTY keyboard, touch screen	QWERTY keyboard	QWERTY keyboard, touch screen	QWERTY keyboard, trackball	QWERTY keyboard, touch screen	QWERTY keyboard, touch screen, trackball	QWERTY keyboard	QWERTY keyboard, touch screen	QWERTY keyboard, touch screen
3G	√	√	√	√	√	√	√	√	√	√
Digital Camera (Megapixels)	3.2 MP	3.0 MP	2.0 MP	2.0 MP	2.0 MP	3.2 MP	3.2 MP	3.0 MP	3.2 MP	3.2 MP
Internet Browser	√	√	√	√	√	√	√	√	√	√
Operating Systems	BlackBerry Handheld Software (RIM)	iPhone 3.0	BlackBerry Handheld Software (RIM)	iPhone OS 3.1	BlackBerry Handheld Software (RIM)	BlackBerry Handheld Software (RIM)	Google Android	Palm OS 5.4.9	Microsoft Windows Mobile 6.1 Professional	Microsoft Windows Mobile 6.1
Wi-Fi	√	√	√	√	√	√	√	√	√	√
Processor	512 MHz	412 MHz	312 MHz	412 MHz	624 MHz	528 MHz	528 MHz	OMAP3430	528MHz Qualcomm	528MHz Qualcomm

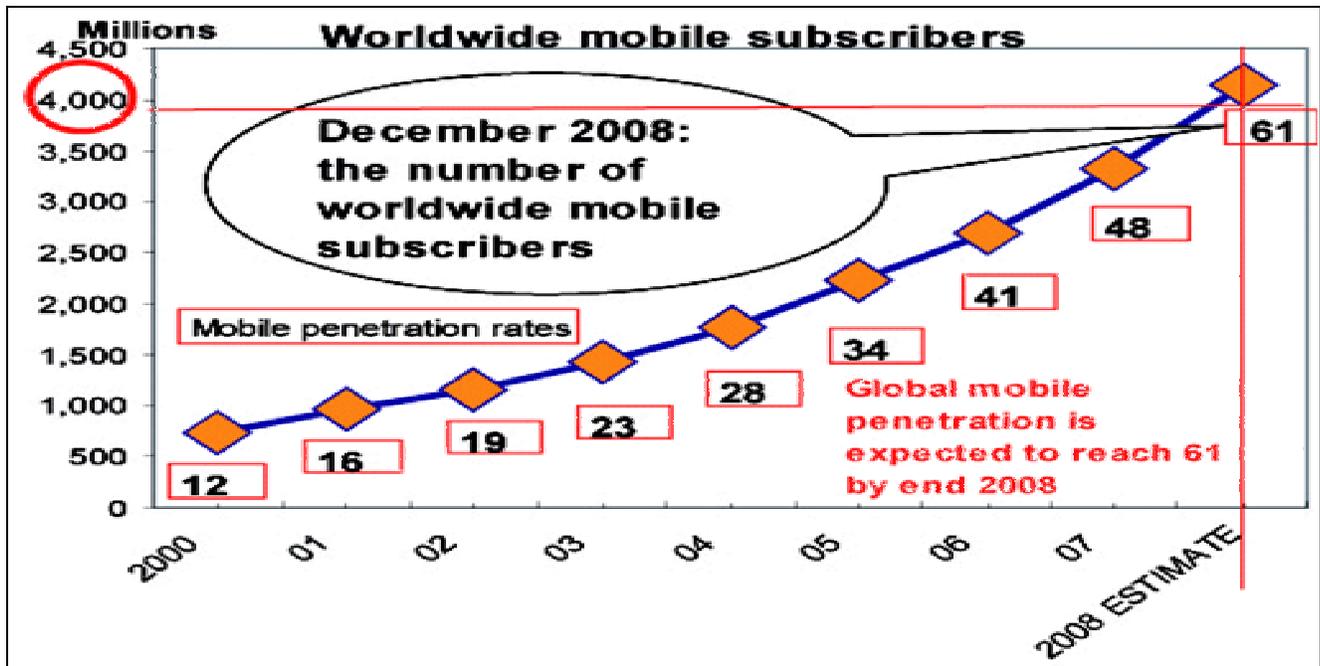
Source: IDC, various sources

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Moving Forward – Opportunities and Expectations

Smartphone as the primary Internet-connection platform

With the total number of mobile cellular subscribers reached four billion in late 2008, smartphone vendors have a colossal field of market to tap in. In a recent survey conducted by Elon University, with respondents from 1,196 leading Internet activists, analysts and Internet leaders, findings show that these respondents expect more major technology advances in the mobile space. Indeed, the hand phone has become a primary device for online access and the smartphone is expected to eventually be the pervasive access to the Internet by the year 2020.



Source: International Telecommunication Union, 2008

The Internet is currently being accessed by 1.6 billion³¹ people, with another billion expected to be added to the current figure in the next few years. Some 77% of respondents said that mobile computing device (smartphone) with more significant computing ability will be the global primary Internet-connection platform in 2020. Of the respondents, 64% favoured the idea that in 2020, user interface will offer more advanced touch, talk, and typing options, while some added another 't' – standing for "think".

Cellco as device manager

Smartphone development indisputably benefits all users, however, not all smartphone users tend to protect their "invaluable" smartphone complete with their friends and contacts addresses and personal notes; and take action against security issues.

Users should equip their smartphones with "PC security" because they see their handset as an extension of the service provider. That is why most people will call the cellco and not the handset maker should they face any problem regarding their phone. This is a business opportunity for cellcos where they can proactively provide the role of device

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manager, offering services like remote lockdown, data-wipes and automatic backup services to unwanted accessing of private data kept in stolen devices. Consumers in Malaysia should learn to step-up such protection for themselves with the service providers' assistance against attacks or malware, spam, stolen handsets and the like.

Smartphones to account for 23% of all new mobile phones by 2013

Juniper Research forecasted that smartphones will account for 23% of all new handsets sold annually by the year 2013.³² Driving interest in smartphones will be the rising demand for more complex multimedia-centric applications. In addition, Juniper also estimated that by 2013, annual sales of smartphone will rise by 95 percent to reach around 300 million units.

Use of web-video applications in smartphone to surge

According to recent study by Nielsen, although mobile-video use is still somewhat of a novelty in the US, about 3% of mobile phone subscribers in countries like the U.K, Spain and Italy use web-video applications. In countries such as Brazil, India and Turkey such applications are used by 1% of total mobile phone subscribers. In US, only 6% of mobile subscribers regularly used web-video applications compared to 58% for text messaging, 28% for picture messaging and 20% for general Internet Use. Applications related to ringtones and video games are also more likely to be used than web-video applications.

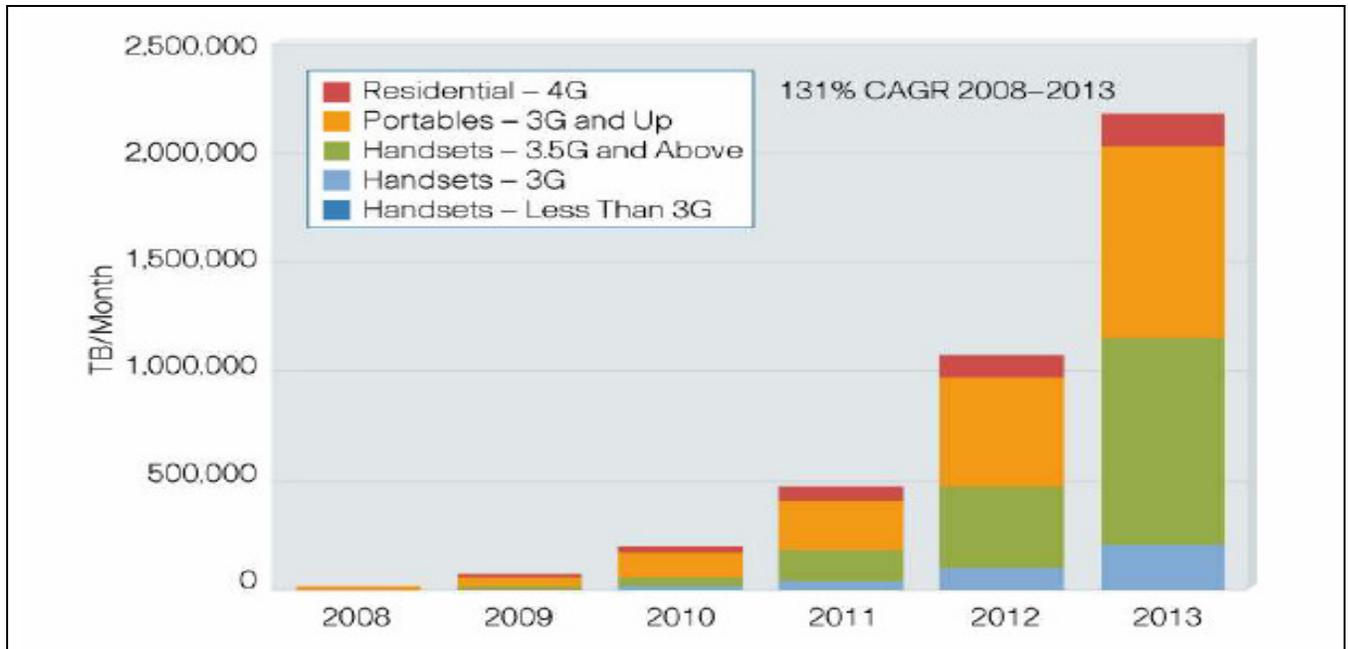
However, mobile video usage is expected to surge in the next few years as more people buy smartphones such as iPhone and BlackBerry, while media companies will continue to provide wider array of video content playable on smartphones. Nielsen reported that US web-video subscribers have jumped 33% during the previous quarter to 20 million. Much of this growth was contributed by the increased number of women, teens and adult accessing the Internet using their mobile devices. Approximately 57 million people were mobile-web users in July 2009, which is an increase of 34% from the previous year.

Smartphone adoption, wider selection of content playable on smartphone and further improvement on smartphone screen size and network connectivity in the future are expected to enable further increase in the use of web-video applications.

Mobile broadband handsets will drive traffic growth

Cisco projected that mobile broadband handsets with speeds of 3.5G or higher, and portable devices will account up to 83% of all mobile data traffic by 2013.³³ This is contributed by the ability of mobile broadband handsets to deliver high speed and large size data to mobile handset users.

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Source: Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, January 2009

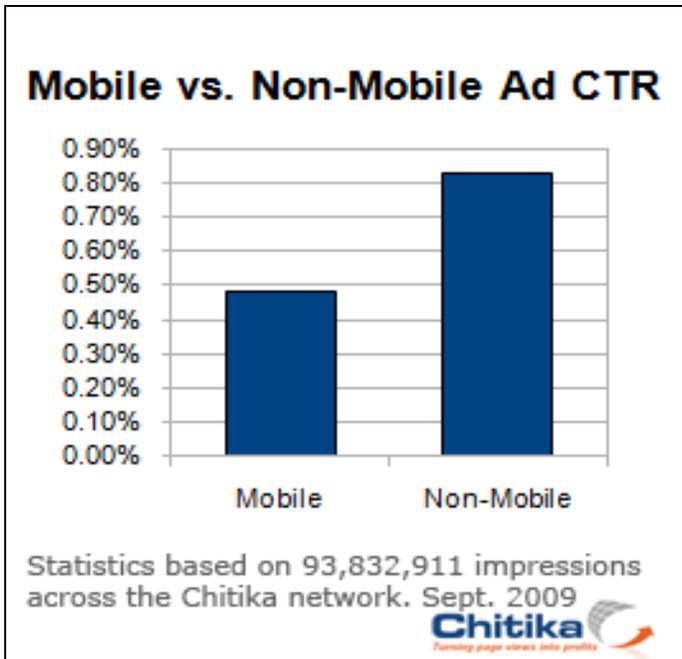
Smartphone and Advertising

While clicking on ads appears still a novelty on the iPhone, there is an encouraging show of clickthrough rates (CTRs) for overall smartphone systems. Of the 94 million impressions cited in the Chitika study³⁴, about 1.3 million (1.5%) came from mobile browsing. Non-mobile held steady with a 0.83% clickthrough rate while mobile as a whole pulled 0.48% – just over half of the average.

The industry's general consensus is that mobile users will likely to click ads. However a study by Chitika indicated that the CTRs are currently lower than expected. It shows that mobile Internet users are disinterested in advertising at an extremely high rate, and iPhone users are among the lead. This assumption by Chitika was derived by comparing same ads on different media.

This spells much developmental work for mobile ads. Nevertheless, generally the potential for mobile ads remain, and for smartphone in particular.

SMARTPHONE – OFFERING PROMISES OF RICH APPLICATIONS



Mobile Internet Browsing & Clickthroughs

Smartphone Systems	% Hits	Clickthrough Rate (% of browsing, rounded)
iPhone*	66	0.30
Other**	24	0.92
Windows CE	2	0.61
Palm	2	0.89
Android	6	0.45
Total Mobile		0.48

* iPhone also accounted for the bulk of mobile hits

**"Other" group comprise mainly BlackBerry users and a small handful of other phone operating systems including Symbian, Nokia, and HTC

Source: Chitika, September 2009

Market for Smartphone will continue to expand

Most industry experts project that unit of sales of smartphone will continue to grow faster than the overall market for cellphones. This trend is likely to continue at least until 2012 or 2013 based upon the increasing user demand. This demand is generally driven by the greater competition for mobile applications that add capabilities.

With the growing number of smartphone users and the increased penetration of 3G and 3G/HSPA services worldwide, smartphone does not only become a vital mobile Internet platform but also provides a wide array of opportunities for various content and applications from the mobile games industry³⁵, mobile financial services, mobile entertainment industry and many others over the online medium.

In terms of market trend, analysts have estimated that after a slower period of growth, affected by current economic condition, the smartphone market will eventually grow not less than 20% per year in the next five years.



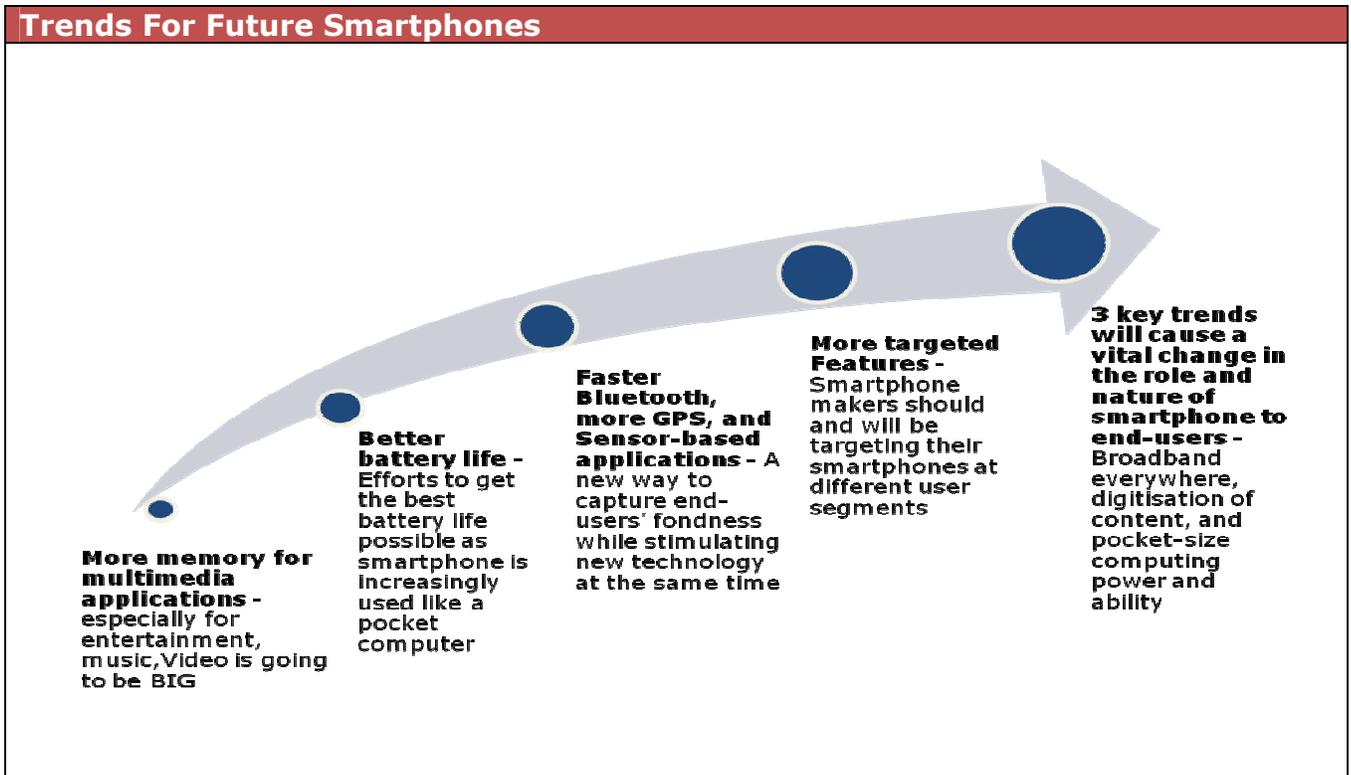
Future growth is also assured given smartphone makers will continue to create a more advanced formulated device that can successfully gratify end user needs of pocket computing on their palm. Larger memory, faster broadband connection and computing ability are some of the key characteristics of future smartphone demanded by end users.

Mobile Banking Access by Device Technology

Device Technology	Percentage of Smartphone Users Who Mobile Bank
Via Internet Browser	44.1%
Via Application	40.6%
Via SMS	25.0%

Source: comScore Mobile Financial Services Report, March 2009

SMARTPHONE – OFFERING PROMISES OF RICH APPLICATIONS



Source: Information from InformationWeek and various websites

Consumers are ready to use technologies they have seen in science-fiction movies, but they still demand the three important elements, that is, value for money pricing, clear differentiation, and the capability to personalise the user experience. With all the three elements being achieved, consumers may no longer look to smartphone as a device restricted to business users but one that is ideally suited for all classes of users, who ultimately want connection and rich applications on the go.

APPENDIX

Appendix 1

Green Initiatives by Telecoms

Programme/ Initiatives	Agency/Body/ Association	Commitments
INTERNATIONAL		
Green Power for Mobile	GSM Association (GSMA)	Programme goal is to assist the mobile industry use renewable energy sources such as solar, wind, or sustainable biofuels to power 118,000 new and existing off-grid base stations in developing countries by 2012. Achieving this target would help save up to 2.5 billion litres of diesel per annum and cut annual carbon emissions by up to 6.3 million tonnes.
Climate Change Initiative (SMART 2020), Energy Efficiency Initiative, e-Waste Initiative	Global Sustainability Initiative (GeSI)	Brings together leading ICT companies – including telecommunications service providers and manufacturers as well as industry associations – and non-governmental organisations committed to achieving sustainability objectives through innovative technology through: <ul style="list-style-type: none"> - open and global forum for improvement and promotion of products, services and access to ICT for the benefit of human resource and sustainable development - stimulate international and multi-stakeholder cooperation in ICT sector - promote improvement in sustainability management & share best practice - encourage companies in developing countries to join and share benefits of GeSI - promote and support partner regional and international initiatives - promote and support greater awareness, accountability and transparency.
ITU and Climate Change	International Telecommunication Union (ITU)	ITU has made climate change a key priority, with strategies to: <p>Reduce the environmental impact through:</p> <ul style="list-style-type: none"> - The creation of a standard methodology for calculating carbon footprint - The promotion of NGNs (reducing power consumption by up to 40%) - Online versus print publications <p>Harness the power of ICTs through:</p> <ul style="list-style-type: none"> - Remote collaboration - Intelligent transport systems - Sensor-based networks based on RFID & telemetry <p>Monitor climate change by:</p> <ul style="list-style-type: none"> - Conducting and managing studies on remote-sensing - Providing key climate data through radio-based applications
Dynamic Coalition on Internet and Climate Change (DCICC)		Moderating the environmental impact of the Internet, to seeking new ways to embrace the power of the Internet for reducing greenhouse gas emissions worldwide, and to enabling transformation in line with the objectives set and to be set under the United Nations Framework Convention on Climate Change (UNFCCC).
The Green Grid	Consortium of IT companies and professionals	A global consortium of IT companies and professionals including those from the telecoms industry to improve energy efficiency in data centres and business computing ecosystems worldwide. Seeks to unite global industry efforts to standardise on a common set of metrics, processes, methods and new technologies to further common goals. Published first two Data Centre Efficiency Metrics in February 2009; power usage effectiveness (PUE) and data centre infrastructure efficiency (DCiE) with the intention for these to be international standards.
EIATRACK	Telecommunication Industry Association (TIA)	EIATRACK systematically tracks, analyses and reports on product-oriented environmental legislation in Europe, Asia Pacific, North America and South America, providing companies a cost effective “early-warning system” for monitoring and evaluating product-related measures.

APPENDIX

ATIS Green Initiatives	Alliance for Telecommunications Industry Solution (ATIS)	<p>Providing global leadership for the development of environmentally sustainable solutions for the information, entertainment, and communications industry. The development of these innovative end-to-end solutions will:</p> <ul style="list-style-type: none"> - promote Energy Efficiencies. - reduce Greenhouse Gas Emissions. - promote "Reduce, Reuse, and Recycle." - promote eco-aware business sustainability. - support the potential for societal benefits <p>These are done through its Exploratory Group on Green, Green Workshop and Network Power Protection Committee (NIPP)</p>
Energy Consumption Rating (ECR) Initiatives	IXIA and Juniper Networks	ECR is a framework for measuring the energy efficiency of network and telecom devices. It is also an open initiative with participants and users from network equipment manufacturers, government agencies, carriers, and enterprises.

Source: Recent Moves in Green Telecom by Various Websites

Telecom Companies Commitment to Green Agenda

Companies	Commitment
Alcatel-Lucent	<p>Reach a 10% reduction in CO₂ emissions from facilities from the 2007 CSR reported baseline by the end of 2010.</p> <p>Determine and report Alcatel-Lucent's direct carbon footprint by the end of 2008.</p>
British Telecommunications Plc	<p>Reduce the worldwide CO₂ emissions per unit of BT's contribution to GDP by 80% from 1996 levels by 2020.</p> <p>Reduce UK CO₂ emissions in absolute terms by 80% below 1996 levels, by December 2016.</p> <p>20% of BT's employees will be actively engaged in reducing carbon footprint at work and at home by December 2012.</p> <p>25% of BT's UK electricity to be sourced from on-site wind power by 2016.</p>
Deutsche Telekom AG	<p>100% of German electricity demand obtained from renewable sources (water/wind/biomass) as from 2008.</p> <p>Reduced CO₂ emissions for Deutsche Telekom Group by 20% below 2006 levels by 2020.</p> <p>Achieve the target of eight million private customers using online billing by the end of 2008.</p> <p>Conduct:</p> <ul style="list-style-type: none"> - a complete review of Deutsche Telekom's energy supply including exploring further potential of all sources of renewable energies, including fuel cells and natural heat of the earth (geothermic) - a complete audit of the energy consumption of Deutsche Telekom's data centres <p>Further investigates and assesses:</p> <ul style="list-style-type: none"> - the use of high efficiency geothermal heat exchangers for cooling and heating - The use of block-type thermal power stations - The optimisation of data centres and switching stations through cooling water <p>Investigates, assesses and ensure the reduction of car fleet emissions by</p> <ul style="list-style-type: none"> - Increasing the number of cars powered by alternative engines (i.e. hybrid) - Using alternative fuels in the vehicle fleet
Ericsson	<ul style="list-style-type: none"> - Complete full peer-reviewed LCA study on mobile communications in accordance with ISO14040 standards - 20% energy efficiency improvement targeted from 2006 to end 2008 for WCDMA RBS - 15% improvement in energy efficiency of GSM RBS products sold from beginning 2006 to end 2008 - Introduce power-saving standby feature for GSM RBS during low load - Have intermediate, publishable results from two to three ongoing projects for LCA, video

APPENDIX

	communications and mobile applications.
France Telecom	<ul style="list-style-type: none"> - Reduce CO2 emissions for FT Group by 20% below 2006 levels by 2020 - Involve 100% of FT Group employees in reducing the company's footprint - Reduce energy consumption for FT Group by 15% below 2006 levels to 2020 - 25% of FT Group electricity in Africa (EMEA) to be sourced from solar by 2015
Nokia	<p>Products:- Reduce the average no-load power consumption by another 50% by the end of 2010</p> <ul style="list-style-type: none"> - Roll out reminders for customers to unplug the charger from the electricity outlet once the phone has been fully charged, across its product range by the end of 2008 <p>Offices and sites:</p> <ul style="list-style-type: none"> - Further energy savings 2007 and 2012 of 6% compared to 2006 levels <p>Green energy:</p> <ul style="list-style-type: none"> - Increase the use of green electricity to 50% in 2010 <p>Operations:- Set energy efficiency and CO₂ reduction targets for global suppliers of printed wiring boards, integrated circuits, LCD's and chargers that are in line with Nokia internal target setting</p>
Nokia Siemens Networks	<ul style="list-style-type: none"> - Production and office facilities energy use targets: - Reduce energy consumption of typical GSM (2G) RBS by 20% by 2010 from the 2007 level of 800W - Reduce the energy consumption of typical WCDMA (3G) RBS by 40% by 2010 from end-2007 level of 500W - Reduce the energy consumption by 29% per ADSL line by 2009 from the 2007 level to meet the Broadband Code of Conduct. With ADSL low power mode, additional 30% savings are possible - Reduce the energy consumption by 49% per VDSL line by 2009 from the 2007 level and target to meet the Broadband Code of Conduct - Continue and further development of energy-saving features during low traffic periods - Production and office facilities energy use targets - Reduce energy use by 6% by 2012, exceeding the official EU target of 5%- - Use 25% renewable energy in company operations by 2009, increasing up to 50% by the end of 2010
Telefonica S.A.	<p>Collect and standardise carbon emissions data in all of Telefonica's operating markets and companies</p> <p>Identify risks associated with future emission limits as well as the opportunities to cut them and improve the company's environmental record</p> <p>Draw up an energy efficiency plan</p> <p>Calculate to what extent the products and services marketed by Telefonica reduce carbon emissions</p> <p>Raise awareness of the need to fight climate change among social and economic agents</p> <p>Establish a company-wide culture of awareness around climate change and energy savings</p>
Verizon	<p>Verizon is committed to enhancing its green profile. Current initiatives have improved the company's carbon intensity 2006 – 207 by 1%. The company is expanding its efforts by a wide range of green initiatives, some of which will incorporate customer participation and/or adoption</p> <p>These will be monitored by a council of senior executives. They include:</p> <ul style="list-style-type: none"> - Promotion of paperless billing - Investigation and/or expansion of alternate energy sources such as solar, wind, and geothermal - Broadband alternatives to travel - Hybrid vehicles - Supporting Hope Line cell phone recycling programme - Benchmarking best practices of leaders in energy conservation and alternate power sources
Vodafone Plc	<p>Reduce absolute CO₂ emissions by 50% against the 2006/07 footprint baseline, by 2020</p> <p>Develop a separate climate change strategy for India and set a target by March 2009</p> <p>Research and reduce the environmental impact of Vodafone's product and services</p> <p>Design and deploy products and services that will help Vodafone's customers to mitigate climate change</p>

Source: *Smart 2020: Enabling the low carbon economy in the information age* by The Climate Group, 2008

ACRONYMS

Acronyms for Smartphone – Offering Promises of Rich Applications

Acronyms			
3G	Third Generation	MID	Mobile Internet Device
4G	Fourth Generation	MMS	Multimedia Messaging Service
CAGR	Compound Annual Growth	MP	Megapixel
CSS	Cascading Style Sheets	MP3	Mpeg Layer 3
EMEA	EUROPE, MIDDLE EAST and AFRICA	OS	Operating System
GB	Gigabyte	P2P	Peer To Peer
GPS	Global Positioning System	PDA	Personal Digital Assistant
LAN	Local Area Network	PND	Personal Navigation Device
LBS	Location Based Service	SMS	Short Messaging Service
MB	Megabyte	Wi-Fi	Wireless Fidelity
MHz	Megahertz	XHTML	Extensible Hypertext Markup Language

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Telephone: +60 3 86 88 80 00
Facsimile: +60 3 86 88 10 00
E-mail: ccd@cmc.gov.my
Website: www.skmm.gov.my
Aduan SKMM: 1-800-888-030
Aduan SKMM SMS: 15888

REGIONAL OFFICES

NORTHERN REGIONAL OFFICE

Tingkat 1, Bangunan Tabung Haji
Jalan Bagan Luar
12000 Butterworth, Pulau Pinang
Tel: +60 4 32 38 228
Fax: +60 4 32 39 448

EASTERN REGIONAL OFFICE

B8004 Tingkat 1
Sri Kuantan Square
Jalan Telok Sisek
25200 Kuantan, Pahang
Tel: +60 9 51 21 100
Fax: +60 9 51 57 566

SOUTHERN REGIONAL OFFICE

Suite 7A, Level 7
Menara Ansar
Jalan Trus
80000 Johor Bahru, Johor
Tel: +60 7 22 66 700
Fax: +60 7 22 78 700

SABAH REGIONAL OFFICE

6-10-10, 10th Floor
No. 6 Menara MAA
Lorong Api-Api 1, Api Api Centre
88000 Kota Kinabalu, Sabah
Tel: +60 88 27 05 50
Fax: +60 88 25 32 05

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SANDAKAN BRANCH OFFICE

Lot No.7, Block 30
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Batu 4, Jalan Utara
90000 Sandakan, Sabah
Tel: +60 8 9 22 73 50
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SARAWAK REGIONAL OFFICE

Level 5 (North), Wisma STA
26, Jalan Datuk Abang Abdul Rahim
93450 Kuching, Sarawak
Tel: +60 82 33 190 0
Fax: +60 82 33 1901

MIRI BRANCH OF THE SARAWAK REGIONAL OFFICE

Lot 1385 (1st Floor), Block 10
Centre Point Commercial Centre
Phase II
98000 Miri, Sarawak
Tel: +60 85 41 79 00/6 00
Fax: +60 85 41 74 00

CENTRAL REGIONAL OFFICE

Level 17, Wisma SunwayMas
1, Jalan Tengku Ampuan Zabedah C9/C
Section 9
40100 Shah Alam, Selangor Darul Ehsan
Tel: +60 3 55 18 77 01
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