Gérard Hermet, Member of the Management Board

GfK SE

10, rue Lionel Terray, F92508 Rueil Malmaison

gerard.hermet@gfk.com

Tel: +33 1 47 14 44 06

Jacques Combet, Strategy and Business Development Director

GfK m2

10, rue Lionel Terray, F92508 Rueil Malmaison

Tel: +33 1 47 14 43 67

jacques.combet@gfk.com

A new methodology to provide reliable and fine grained marketing information on mobile internet

ABSTRACT

The deployment of mobile internet among wider professional and consumer audiences is accelerating the development of new mobile services, providing the Brands with opportunities for new marketing operations and better targeted advertising campaigns. The fragmentation of mobile internet flows, programs, contents and audiences is complicating the monitoring of traffic and brings complexity in understanding mobile internet usage.

The objective of this study is to analyse the environment supporting the fast deployment of mobile internet and to describe a new, disruptive methodology that provides reliable, accurate and fine grained marketing information on mobile internet.

The possibility of mixing mobile content traffic data and consumer demographics is considered as a major contribution of the usage of new technology to study consumer behaviour.

KEY WORDS

Mobile Internet, Mobile Services, Web Audience Measurement, Monetization, Internet Protocol, NIS, Mobile Marketing, Passive Consumer Panel.

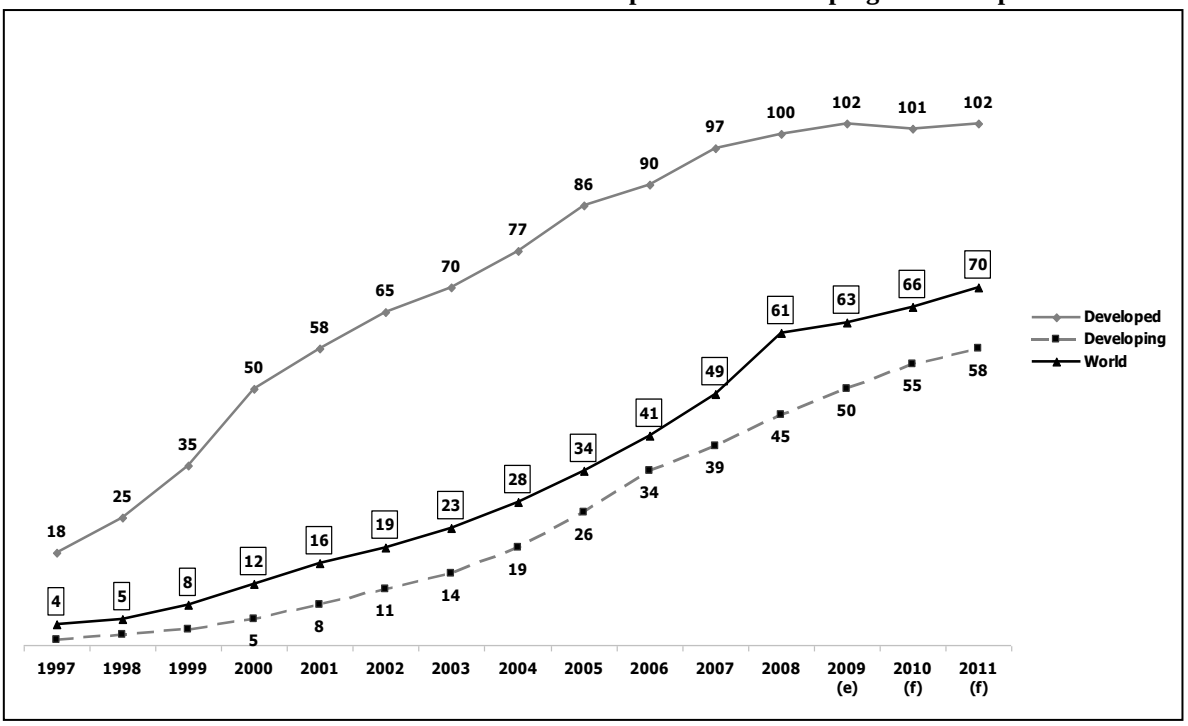
1. INTRODUCTION

1.1. Background

1.1.1. Voice revenue under threat in mobile networks

The mobile phone has become the most widely used electronic device in the world. In 2009, telecom operators control over 4 billion mobile subscriptions owned by more than 3 billion mobile consumers.

Table1: Worldwide mobile telecommunications. Developed versus developing countries penetration rate



Source: GfK Retail and Technology

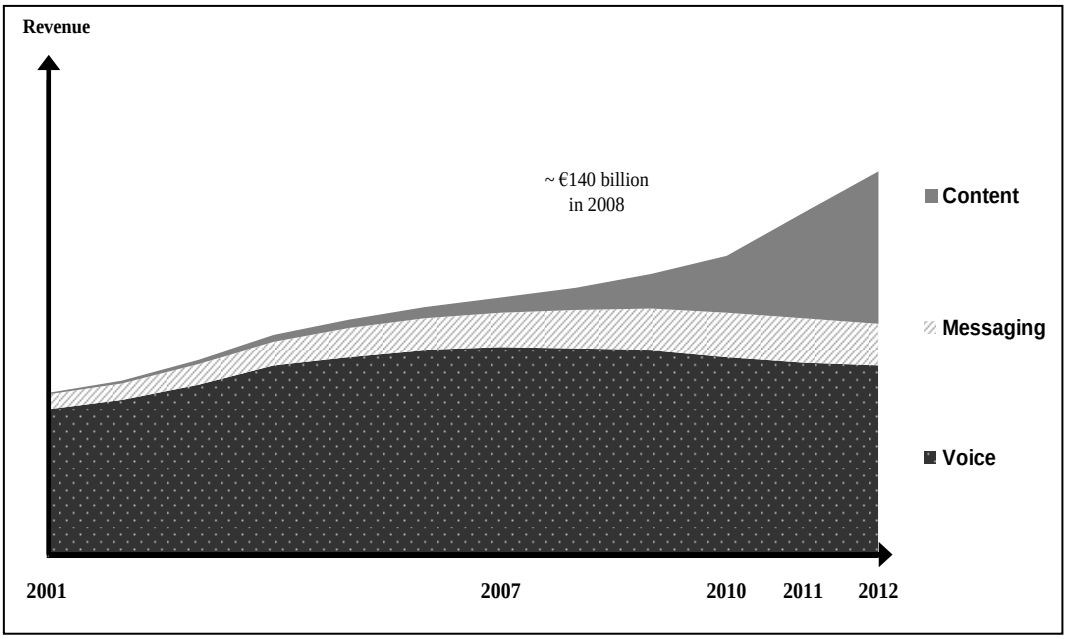
But price pressure is increasing.

The telecommunication regulatory bodies are actively contributing to reinforcing the negotiation power of MVNOs, weakening potential collusion by MNOs and facilitating number portability where it is not a common practice. The European Union is also contributing to mobile communication tariff control. The Ministers of the European Union's 27 member states have formally adopted the new EU roaming rules proposed by the European Commission in September and approved by the European Parliament in April. The new regulations have come into force on July 1st 2009, and will lead to further reductions of up to 60 percent on bills for consumers roaming in the EU.

Free mobile phone calls become possible as VoIP is entering the mobile sphere.

Although voice remains the mobile operator's main revenue generator, price per minute on voice is decreasing and voice ARPU is no longer growing.

Table 2: Data (Content + Messaging) will equal voice revenue in 2012



Source: GfK Retail and Technology

1.1.2. Mobile data service revenue on a growth trend

- Fast growing mobile internet usage

The deployment of broadband technologies on mobile networks, the successful introduction of Ultra Mobile Personal Computers offering internet access with 3G dongles or embedded 3G modem and the surging sales of open OS Smartphones are significantly boosting mobile Internet usage among a much wider audience. The spread of iPhone continues to boost data usage for those operators that distribute the model with O2 reporting that 40% of its data traffic in UK comes from the Smartphone market in 1Q09 (source: Informa Telecoms & Media's reported by *Mobile Europe, July 22nd 2009*). Operators data revenue rose by +24% in 2008.

Table 3: Actual Data Revenues by Geography, 2007-08

	2007 (US$ million)	2008 (US$ million)	Y-o-Y Change
Africa	2,700	3,571	32%
Americas	7,974	11,040	38%
Asia Pacific	60,757	74,094	22%
Europe	50,380	57,746	15%
Middle East	2,103	3,076	46%
US/Canada	28,129	38,827	38%
Total	152,043	188,734	24%

Source : World Cellular Information Service, Informa Telecoms & Media

- Compelling services

The mobile internet delivers applications and value added services addressing a two-fold purpose (Joe Laszlo IAB, Journal of Advertising Research March 2009)

- personal productivity services enabling to "save time" such as
    - location based services
    - internet browsing
    - m-commerce
    - e-mailing
- entertainment services enabling to "fill time" such as
    - multimedia downloads (music, video, games)
    - mobile TV (video streaming on 3G)
    - digital medias (information services)
    - Instant Messaging (chat)
    - social networks (Facebook, Myspace, Twitter…)

These value added services offer a sound value creation potential as mobile applications and mobile services offer numerous opportunities for creating revenue flows through "pay-as-you-use" or "advertising sponsored" models.

- Mobile advertising

Mobile advertising can be delivered in different formats: opt-in schemes to send ads via SMS or MMS, display space on websites, search based ads and ads that are inserted in multimedia contents (video games, music and videos, 3G TV programs etc).

In the mobile ecosystem, the subscriber is the user (to the exception of the youth community where subscriptions are under the parent name) and the Brands can establish a direct, personal and permanent relationship with the consumer. Compared to other media, mobile advertising campaigns offer unrivalled precision.

Until recently, mobile advertising spending has been relatively small, however advertisers are beginning to look at the mobile phone as an advertising platform offering distinct advantages.

Mobile advertising campaigns offer precision like no other medium (Khurana S. paper published by the Mobile Marketing Association, 2009). In those conditions, advertising could become a significant contributor to the mobile internet monetization. In the 2009 recessionary environment, m-advertising started showing positive developments while off-line advertising and -to a lesser extent- e-advertising, are negatively impacted (France Observatoire de l'e-publicité reported on-line advertising decline in 2009 (-7% in 1st half 2009 vs 2nd half 2008), while m-advertising is the only media enjoying a stronger growth in 2009 (+30% in 1st half 2009) than in 2008 (+15%)).

1.1.3. Necessity to measure the traffic.

The fast developing usage of mobile internet, associated with the profusion of mobile services and the deployment of mobile advertising reinforces the need for marketing metrics that would enable the Brands to better target their marketing operations and accurately measure their efficiency. This has become an essential condition to sustain the mobile internet value chain.

1.2. Questions

1.2.1. Methodology prerequisites for measuring mobile internet

Marketing researches that are currently used for measuring mobile internet traffic are essentially based upon a consumer centric methodology which presents severe limitations

(see "*A new challenge for Retail and Media: From Consumer centric to network centric*" by Gérard Hermet May 2007). The consumer panel sizing and the declarative model cannot offer a reliable and comprehensive analysis of the mobile internet. The traditional methodologies are not able to cope with the fragmentation of applications, contents, content flows and audiences on mobile internet and the error margin is very often greater than the audience share of the content flows targeted by the measure.

A new methodology has to be invented to properly measure mobile internet, mobile advertising and mobile services usage. This new methodology will have to:

- Provide comprehensive and fine grained metrics
- Permit a reliable analysis of the long tail
- Enable cross media analysis, notably comparing usage of the three screens (mobile, TV and PC)
- Be future proof and resist to the rapid changes of the mobile market conditions (many introductions of new feature rich mobile devices, new IP infrastructures and new mobile networks, improved service offer… and ever-changing consumer patterns)
- Be non intrusive for the operators and protect the subscriber's privacy
- Be adopted as a global currency unit
- Speed-up metrics report delivery (providing if possible on-line reporting facility)

This paper will address the environmental conditions that are now very favorable to the creation of a true value chain over mobile internet, review the different marketing research approaches that are available to measure the mobile internet usage and describe a disruptive methodology that will provide the telecom and media industry with the indispensable metrics that are needed to further develop the value creation in this promising sector.

2. THE MOBILE INTERNET MARKET

2.1. Worldwide market:

2.1.1. A globalization trend

- A global consumer

One third of the world population is equipped with a mobile phone. This, together with the fast development of mobile Internet usage, in all regions of the world, is provoking the emergence of a new “global species”: the mobile Internet consumer.

- Global players in the mobile internet sphere

The massive investments required by the telecom markets have lead, over the past decade, to a profound restructuring of the industry and gave birth to a few global international actors who develop hardware and software components, equipments (network infrastructure and terminals), contents and services (network operators and content providers).

- Global Brands

Successful Brands are the ones that manage to install and durably sustain their position at worldwide level. Global consumer segments drive the development of global marketing programs, cutting across national and cultural boundaries. Advances in telecommunications technologies, and more specifically in mobile telecommunications, significantly influence consumption patterns on a global scale and also provide those global Brands -that have heightened expectations in the digital world- with a very powerful new marketing tool.

2.1.2. A strategic focus for all key actors

- Network infrastructure manufacturers

A relatively low number of companies are participating to the development and installation of the 3G and 3G+ (HSDPA and HSUPA) broadband cellular infrastructure networks that support the data speed required to access mobile internet in a satisfactory manner: Ericsson, Nokia Siemens Network, Alcatel-Lucent, Huawei, ZTE. Most of them are already developing the next generation of broadband cellular infrastructure (LTE) that will give mobile internet the comfort of broadband ADSL, and certainly contribute to further developing the potential of the mobile internet value chain.

- Network operators

Mobile operators fanned out their presence across several regions in the world, contributing to the creation of a homogeneous mobile and mobile internet culture. Vodafone, Orange, Telefonica, T-Mobile, TIM, AT&T, DoCoMo have been very active in that field, and do participate to the acceleration of the market globalization trend. Facing a tough competition on voice and SMS tariffs, all mobile operators are focused on expanding revenues through developing ARPU (average revenue per user) with data services. This encourages the development of content and application platforms and, in many places, strongly impacts the terminal retail pricing when Smartphone's are heavily subsidized (iPhone sold at 1€ by T-Mobile in June 2009 etc.), with a subsequent virtuous circle and positive impact on mobile internet usage.

- Smartphone manufacturers

In a difficult economic environment, the fast development of the Smartphone segment is sustaining the entire mobile phone industry. Open Operating System, large screen, intuitive user interface and access to a broad and versatile range of applications are the prerequisites for success. Apple succeeded to establish the iPhone as a blockbuster, stimulating creativity and innovation of its competitors, notably Nokia, RIM, LG, Samsung and HTC who are accelerating their product development effort. New comers are considering the Smartphone sector as a strategic domain. Palm, the manufacturer of the very popular PalmPilot organizers in the 90's, made a come back in the Smartphone sector with Pre, designed by ex Apple engineers, Google subcontracted to HTC the manufacturing of the HTC G1, based upon the Google Operating System, Android and Microsoft are introducing Windows Mobile in the fourth quarter of 2009.

Table 4: Mobile/Smartphones, product shares in touch segments, Europe (25 countries) April 2009

TOUCH ONLY				KEYBOARD+TOUCH				TOUCH+NUM-BLOCK			
Product	DESIGN	Sales Units	Sales Units%	Product	DESIGN	Sales Units	Sales Units%	Product	DESIGN	Sales Units	Sales Units%
<GT>		1.316.935	100,0	<GT>		78.922	100,0	<GT>		169.080	100,0
NOKIA,5800 XPRESSMUSIC	BLOCK	276.421	21,0	SONY ERICSSON,XPERIA X1	SLIDER	21.532	27,3	SAMSUNG,S8300 ULTRA TOUCH	SLIDER	111.131	65,7
SAMSUNG,SGH-F 480 (3G)	BLOCK	243.087	18,5	T-MOBILE,G1 GOOGLE	SLIDER	17.621	22,3	LG,KF700	SLIDER	15.849	9,4
LG,KP500 COOKIE	BLOCK	169.260	12,9	HTC,TOUCH PRO	SLIDER	4.171	5,3	LG,KF750 SECRET	SLIDER	13.760	8,1
LG,KU990 VIEWTY	BLOCK	106.368	8,1	T-MOBILE,MDA COMPACT IV	BLOCK	2.958	3,7	LG,KF600	SLIDER	8.110	4,8
APPLE,IPHONE 3G 8GB	BLOCK	116.190	8,8	HTC,TYTN II P4550	SLIDER	2.649	3,4	SONY ERICSSON,G900	BLOCK	4.036	2,4
APPLE,IPHONE 3G 16GB	BLOCK	64.620	4,9	LG,KF900 PRADA II	SLIDER	2.602	3,3	SONY ERICSSON,G700	BLOCK	3.791	2,2
LG,KP501 COOKIE	BLOCK	58.595	4,4	FLY,SX 200	SLIDER	2.052	2,6	HTC,TOUCH DUAL	SLIDER	2.353	1,4
SAMSUNG,SGH-I 900 OMNIA 8GB	BLOCK	37.014	2,8	HTC,DREAM	SLIDER	1.492	1,9	SAMSUNG,SGH-I 740	BLOCK	1.905	1,1
SAMSUNG,M8800 PIXON	BLOCK	36.986	2,8	SAMSUNG,SGH-I 780	BLOCK	1.506	1,9	SONY ERICSSON,W960I	BLOCK	1.586	0,9
LG,KM900 ARENA	BLOCK	33.555	2,5	TRADEBRAND	BLOCK	1.311	1,7	ASUS,P 750	BLOCK	1.333	0,8
BLACKBERRY,STORM 9500	BLOCK	24.670	1,9	T-MOBILE,MDA VARIO IV	SLIDER	1.861	2,4	LG,KF755	SLIDER	1.208	0,7
HTC,TOUCH HD T8282	BLOCK	17.857	1,4	ABEO,BK-72	BLOCK	1.077	1,4	SONY ERICSSON,W950I	BLOCK	691	0,4
LG,KC910 RENOIR	BLOCK	15.540	1,2	ANYCOOL,T828	BLOCK	823	1,0	LG,KF750 SECRET GOLD	SLIDER	615	0,4
SAMSUNG,SGH-I 900 OMNIA 16GB	BLOCK	13.008	1,0	PALM,CENTRO	BLOCK	810	1,0	ASUS,P 527	BLOCK	598	0,4
HTC,TOUCH DIAMOND (P3700)	BLOCK	13.250	1,0	HTC,DREAM	SLIDER	767	1,0	ASUS,P 526	BLOCK	391	0,2
SAMSUNG,SGH-D 980	BLOCK	9.047	0,7	ORITE,ME-2	BLOCK	765	1,0	WAYTEQ,H626	BLOCK	259	0,2
HTC,TOUCH 3G	BLOCK	5.237	0,4	SONY ERICSSON,P1I	BLOCK	987	1,3	HP,IPAQ 614	BLOCK	157	0,1
ETEN,GLOFIISH X800	BLOCK	4.162	0,3	TOSHIBA,PORTEGE G910	FLIP	697	0,9	MIO,A702	BLOCK	137	0,1
SFR,341	BLOCK	3.829	0,3	HP,IPAQ 614C	BLOCK	663	0,8	LG,KF757	SLIDER	780	0,5
T-MOBILE,X760 VAIRY TOUCH	BLOCK	3.786	0,3	HP,IPAQ 914C	BLOCK	624	0,8	PORSCHE DESIGN,P9522	BLOCK	67	0,0

Source: GfK Retail and Technology

- Operating Systems developers

Open Operating Systems are needed to allow rapid integration of application software modules (such as browser, Java engine etc.), facilitate the developments of applications from independent developers and consequently leverage the deployment of mobile applications and mobile services. The most active contributors to Operating System development are the two leading smartphone brands Apple (iPhone OS), and RIM (Blackberry OS). Software developers are also very active: The OS from Symbian (now fully owned by Nokia) is used by leading mobile phone manufacturers notably by Nokia, Samsung, LG. The Microsoft Windows Mobile OS was adopted by 50 manufacturers and 160 mobile operators, and Google (Android) and Linux (LiMo) are expected to become a leverage factor in this new strategic territory.

- Content and application stores

The mobile internet market is a sector where vertical integration makes the most sense. A worldwide dominant position can be obtained and maintained by those who are able to create high volume demand with appealing handsets and sustain post-purchase consumer loyalty with an enjoyable access to a broad library of appealing mobile services. This is an area where

Apple (App Store, iTunes) has taken the lead in the industry (above 1,5 billion applications downloaded in one year on 37 millions of IPhone and iTouch), but most of its competitors are actively developing application platforms: Nokia (Ovi Store), RIM (AppWorld), Google (Android Market) and Microsoft (Market Place).

2.1.3. Broadband mobile subscribers

At the end of March 2009, more than 225 million subscribers were connected to broadband mobile telecommunication (all technologies), worldwide. This represents a 93% year-on-year growth. One must point out a very active trend in all regions, the highest penetration rate is in Asia Pacific while Latin America enjoys the highest growth (385% year-on-year growth to over 10 million subscribers). Typically in many emerging markets, fixed broadband access remains limited and recently deployed third-generation networks are used as a way of diversifying operators revenue streams by connecting consumers for whom an internet connection has until recently been out of reach (source Informa Telecoms & Media's reported in Mobile Europe, July 22nd 2009)

2.2. Technical aspects

2.2.1. IP transmission on cellular networks

Internet data are conveyed in packet mode. The General Packet Radio Service (GPRS) system is used by GSM mobile phones for transmitting IP packets. It also provides support for UMTS networks (3G and 3G+). With the deployment of broadband technologies, data network capability is increasing. Download speed of up to 2 Mbps is now possible, enabling comfortable access to multimedia services in mobile conditions.

The Gateway GPRS Support Node (GGSN) is a key component in the mobile network architecture as it is responsible for the interworking between the GPRS network and the Internet network. On a mobile network, the GGSN is the point of convergence of mobile data traffic. Depending on the size of the country there are between 3 and 15 GGSN on each operator network.

Table 5: Data transmission speed on cellular networks

Network generation	**2,5G** GPRS	**2,75G** Edge	**3G** UMTS	**3G+** HSDPA HSUPA
Typical download speed	56 Kbps	120Kbps	200-380Kbps	1-2 Mbps
Applications	MMS	Internet browsing	Internet Browsing e-mail IPTV	Video (uplink/downlink) Networked gaming

2.2.2. Capturing IP information with Network Intelligence technology

Traditional methods of network data mining are unable to keep up with the exponential increase in IP communications and volumes of content generated. A new generation of network data gathering technology, Network Intelligence, is now available. It not only captures networked data in motion but also provides context by extracting underlying metadata: who/what/when (Qosmos White Paper July 2009).

The new generation of network technology, Network Intelligence, which has evolved from the core capabilities of Deep Packet Inspection (DPI) is an enabling technology developed by pure players like Qosmos who are enabling a wide range of applications such as Lawful Intercept or Network Protection and also are opening a brand new territory for the marketing research industry with Customer Segmentation, Subscriber Behaviour and Usage analysis and Audience Measurement.

The Network Intelligence technology is using semantic and grammatical analysis and is able to drill down into very deep traffic analysis if required. It is purely based on software and can support multi Giga bps line rates.

On mobile network, the Network Intelligence technology is typically installed on the Gn interface of the GGSN.

2.2.3. Key technologies serving the mobile eco-system

The fast growing mobile market is boosting funding and development of a large number of technologies that can contribute to the mobile eco-system. Among those developments, it is important to point out two areas that will have a major impact on the provision of compelling mobile services.

- Location based services enabler: A-GPS

GPS, the full name is NAVigation System with Timing And Ranging Global Positioning System (NAVSTAR-GPS) is providing users with the capability of determining position, speed and time, whether in motion or at rest, with a 3-dimensional positioning capability and a high degree of accuracy. This method employs a Global Navigation Satellite System, and the position is read on the satellite receiver (PND or Personal Navigation Device) which has to be exposed to the satellite signal (i.e. outdoor).

With A-GPS (assisted GPS) additional data is received from an external source, the mobile network, enabling the mobile terminal to obtain a position in all conditions, outdoor or indoor, even when the mobile terminal is not directly exposed to the satellite signal.

40% of all mobile phones sold in a year (>400M units) and 100% of Smartphones are forecasted to have A-GPS functionality by 2011. A-GPS solutions spawn promising new markets in location based services:

- Information (news, find hotel, find restaurant, find ATM machine)
- Navigation (direction, traffic and alerts)
- Entertainment (gaming, dating and community)
- Emergency
- Commerce (m-commerce)

Among the vast range of location based applications, location-based advertising (LBA) is offering a radically new form of advertising channel and has a very rich potential.LBA involves the provision of advertising messages to cellular subscribers based on their location. With LBA, Brands can reach consumers when and where they are most likely to make a purchase. Advertisers can then deliver advertising messages contextually through the media on a geographically targeted basis. (Heng Xu, Lih-Bin Oh, Hock-Hai Teo Int J. Mobile Communications Vol 7, N°2, 2009)

- Mobile payment enabler: NFC

Near Field Communication or NFC, is a short-range high frequency wireless communication technology which enables the exchange of data between devices over about a 10 centimetre distance. NFC devices are compatible with existing contactless infrastructures. Primarily aimed at usage in mobile phones, NFC transforms the mobile phone into a payment device (ticketing system) in public transportation or at any point of sales located on the mobile user route. In Japan, the NFC applications are already widely developed. In particular, Mobile FeliCa a mobile wallet solution developed by Sony and NTT DoCoMo, and other developments such as Mobile Suica are used on the Japan Railways network.

These two technologies that enable the association of location based services and mobile payment demonstrate the endless capability of the new mobile devices and the value creation potential in the mobile ecosystem.

2.3. Mobile phone and Marketing / Market Research

2.3.1. Mobile internet: a promising territory for marketers

- The mobile internet user is outlining what will surely become the most coveted consumer of the 21st century:

  - a probably better educated consumer
  - a higher income consumer
  - an early adopter of new technologies and new products
  - an opinion leader (in the family, in the street, in the society)
  - a possible virtual marketing actor (MMS)
  - loyal to global brands
  - … and permanently connected

- Mobile internet enables a privileged contact with this “ideal consumer ”

  - at any time: in busy periods when access to business information is critical and in idle moments when access to entertainment/ infotainment is welcomed.
  - anywhere: A-GPS enables a permanent tracking of the consumer position with a targeted location based service proposition

- personal: while it is often difficult to guess who is behind a PC internet connexion (unless using captive portal or dedicated home gateway solutions), it is easier to know who is connected to mobile internet on a cellular network.

- The mobile internet terminal is a very powerful device, constantly improving access and navigation

  - the screens have drastically improved in terms of size, pixel count, contrast and user interface ("touch screen").
  - The multi-mode 3G-WiFi connexion capability offers convenient and affordable internet access
  - the user interface is intuitive
  - the memory capacity is huge, enabling rich off-line usage
  - the development of client-server applications has no limit

2.3.2. A media and a retail channel

2.3.2.1. A media

Telecom operators in general and mobile operators in particular are deploying broadband networks to generate/increase revenue streams with new services. The improved 3G+ network bandwith enables comfortable mobile connexions to multimedia programmes and 3G TV. The network operators are repositioning themselves as "media companies" (ex H3G positioning claim in Italy: "3 the Mobile Media Company") and many operators like Orange are acquiring broadcasting rights in the fields of television, cinema, music, games, news and sports (the budget dedicated to this activity by Orange is 400M€ in 2009) and begin investing in cinema via a joint-production subsidiary (Orange: Studio 37). In this context, they are projecting a growing revenue stream from subscriptions to content and infotainment programmes as well as advertising insertions in those contents and programs.

2.3.2.2. A retail channel

Mobile commerce offers a new business potential (Hseh C, Jones C., Lin B. International Jounal of Mobile communications, 2008,). The on-line "mobile internet channel' is a communication channel allowing customers to access and search through a great amount of information such as price or product characteristics and it makes it easy to gather information

about customers via surveys. It is also a transaction channel and a distribution channel where Retailers can reach a much bigger customer base, without geographic border, enabling a 24 hours a day and 7 days a week customized promotion and sales to individual customers *("Loyalty Effect and Price Response at Online and Offline Channels byM. Arce-Urriza and J. Cebollada-Calvo January 2006)*

While mobile internet is primarily perceived as a "mobile media", it is also a powerful retail channel, becoming a vast virtual mobile shopping mall, enabling convenient and permanent access to a broad range of products/services, multimedia content downloads, location based services and m-commerce.

2.3.3. A new media or a marketing instrument?

Mobile internet is a media. It is also a retail channel. And it can be a very powerful marketing instrument. This dimension is precisely described by A. Mooney and C. Lin in their paper "Mobilizing Sales" published by the MMA (2009) and has to be put in relation to key elements such as:

• The ability to create a sustained presence for the Brand

• The two-fold entertainment and/or utility provision, consumers need to see the value in whatever Brands are offering – whether that is a coupon or a laugh.

• The relevance, as one of the biggest advantages of mobile is three-point targeting: time, location, and demographics.

• Putting the consumer in control, allowing people to opt-in and opt-out at any time.

• Promoting interaction through mobile texting, enabling the Brands to have a conversion with their consumers.

The capabilities offered by this powerful marketing instrument will provide the Brands with a much stronger, much closer relation with their customers, and, at the same time, enable online monitoring of the efficiency of their marketing operations, with the possibility to continually adjust their marketing programmes and resource allocation for an optimized return on investment.

2.3.4. Associations promoting the usage of mobile phone services and mobile advertising

Two associations are very active: the GSMA (GSM Association) and the MMA (Mobile Marketing Association).

- The GSMA is a global trade association representing the worldwide mobile communication industry, with nearly 800 members belonging to the mobile operator community and more than 200 members from the broad mobile ecosystem (equipment manufacturers, software companies, Internet and media and entertainment companies). The GSMA has created a Mobile Media & Entertainment Programme (MMEP) to facilitate interaction between the mobile, media and entertainment industries which create and deliver media rich content based services such as advertising, music, film and gaming over the mobile medium. The GSMA has also launched a Mobile Advertising Program with a steering group of 20 operators from around the world including a working group around measurement and metrics. One of the key objectives of that group is to develop well defined metrics, and then joint actions by operators to deliver those metrics in a consistent way.

- The MMA directly contributes to creating a standardised approach to mobile advertising, and is forcing the industry to monitor and enforce consumer protection and privacy (such as: the consumer must "opt-in" to mobile marketing programs and must be allowed to easily terminate or "opt-out" unwanted programs, data supplied by the consumer for marketing purposes should be used to tailor such marketing to the interests of the consumer. The marketer must effectively manage and limit mobile messaging programs to a reasonable number of programs and must commit to not sharing consumer information with non-affiliated third-parties).

- At the local level, associations regrouping the different members of the mobile value chain are developing initiatives to support the development of this emerging sector. In France, the "Association Française du Multimedia Mobile" (AFMM) is particularly active.

3. MEASUREMENT AND METRICS

3.1. Necessity to measure

3.1.1. Monetizing the space

Mobile internet undoubtedly offers a major opportunity for value creation. This value creation will combine the monetization potential of a media offering a broad range of advertising formats, with the revenue streams generated by a retail channel and a powerful marketing instrument.

- Media space monetization

An appropriate advertising pricing model is needed for mobile internet. It requires an undisputable measure of web site and web page traffic and a reliable monitoring of advertising efficiency

- Retail channel monetization

The retail channel revenue streams are multiple and will require a precise monitoring of all retail activities which constitute the main sources of value creation: multimedia content downloads, access to mobile applications and to location based services, shopping on m-commerce.

3.1.2. Tracking consumer attitude / behaviour

- Given the importance of the evolution of the mobile consumer, this new species in the mobile ecosystem, a fine grained monitoring of the mobile internet user attitude and behaviour has become a necessity. This requires an accurate tracking of web itineraries, a proper monitoring of displayed and clicked advertising exposure and a comprehensive analysis of sales activated through mobile internet. Coupling all internet measures with socio-demographics information has become mandatory to satisfy the Brands and advertisers requirements.
- The terminal is obviously the essential link between the mobile consumer and the mobile media and retail channel. The nature of the terminal is strongly influencing mobile

internet usage and correlation analyses integrating the mobile terminal and the internet usage will become very useful.

3.1.3. Access to an impressive data base

- Mobile internet measurement has to cope with a rapidly growing mobile internet subscriber base increasingly using a new generation of Smartphones which are boosting mobile internet usage. A reliable tracking of mobile internet will necessitate monitoring of the long tail.
- This new marketing research will require the ability to access, process and offer immediate reporting from an unprecedentedly massive amount of information.

3.2. Methods to measure mobile internet usage

3.2.1. Description of different methods

3.2.1.1.User centric

- This methodology is based upon consumer panels. The panels are either based upon group of consumers who respond to questionnaires on an ad-hoc basis (declarative model) or group of consumers who have formally accepted to be tracked on an on-going basis (opt-in model).
- The declarative model enables high level information collection on main web usage, most visited web sites, last product or service purchased on the internet (top of mind lists).
- The opt-in model requires the installation of a tracing software that enables on-going collection of the logfiles generated during the internet journey of the consumer.

3.2.1.2.Site centric

- This methodology enables a site to measure its own traffic.
- The site centric approach is notably used by the web analytics sector. The measurement of web, web pages audience is based upon the collection of logfiles generated by the server of each web site.

- When used for marketing research purposes (such as traffic share), this methodology aggregates data from a closed list of web sites belonging to a particular universe (example: news web sites in a particular country, web sites linked to a given portal…).
- The key disadvantage of the site centric approach is the necessity to get approval of the sites (millions) to be able to correctly measure the web traffic.

3.2.1.3.Network centric

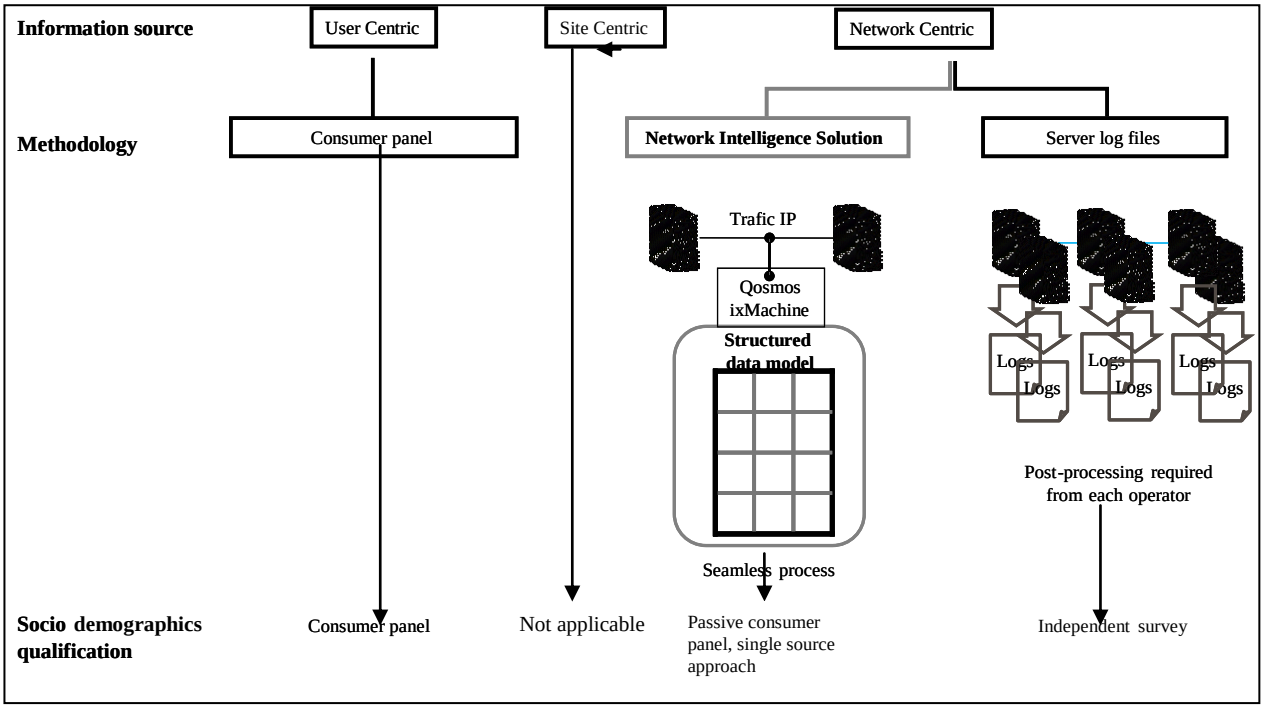
- The network centric approach enables collection of information from capture points located on the IP network.
- The information is either based upon existing logfiles generated by network servers (on fixed internet networks: Broadband Access Servers, DSLAM etc. and on mobile internet network, the GPRS Gateway Service Node) or collected from the IP flow, using Deep Packet Inspection technology installed those capture points.
- The network centric solutions provide access to a very comprehensive set of information and enables reporting of fine grained metrics. Both of these methodologies can measure the long tail.
- Measurements based upon network centric methodologies handle very large amount of data (census, very large sample). These solutions are the best to avoid any statistical error.
- The network centric methodologies are not conditioned by a preliminary agreement from the consumers but require a very strict anonymisation process in order to comply with the privacy laws.
- Among the network centric methods the one using the IP Protocol seems to be the best to fulfil all the needs of Marketing and Advertising research.

3.2.1.4.Socio-demographic information can be coupled with traffic measurement with the network centric methodologies

- Advertisers and Brands require audience measurement metrics providing socio-demographic characteristics. The network centric sources data are anonymised and cannot provide the socio-demographic information. The recruitment of a consumer panel enables to obtain the needed socio-demographic dimension:
- The recruited panellists formally allow the marketing research institute to merge their socio-demographic profile to the collected web usage data.

- The IP flow based methodology enables a single capture point for data collection hence a single source qualified traffic measurement whereas the logfiles methodology implies the merge of a consumer panel with the market data.

Table 6: The Network Intelligence Solution



3.2.2. Benefits of the network centric methodology

Mobile internet usage data can be obtained from different sources and analysed with different methodologies which do not offer the same metrics reporting capacity.

Table 7: Comparison between consumer centric and network centric methodologies

Data characteristics	Consumer centric methodologies (consumer panels)		Network centric methodologies (information collected from network)	
	User monitoring	**Device monitoring**	**Network Intelligence**	**Log collection**
Granularity	low	medium	very high	medium
Accuracy	low	high	high	medium
Reliability	low	low to medium	very high	medium
Capacity to measure all mobile internet information	poor	low	full	medium
Socio-demographics information	yes	through additional survey	Single source approach through passive consumer panel	through independent survey
long tail analysis	no	no	very accurate	quite accurate
information reporting	monthly	weekly	weekly, daily, online	heavy data post processing weekly is the utmost
Capacity to measure advertising efficiency				
Clicked ads monitoring	no	no	yes	yes
Displayed ads monitoring	no	no	yes	no

While the most common approach to collect mobile internet usage information is consumer panels based upon samples of mobile phone users, this methodology is not satisfactory when the objective is to obtain comprehensive insight reports.

A proper monitoring of online mobile advertising has become mandatory. Only network centric methodologies can contribute to this marketing research domain, and only the Network Intelligence based on IP protocol methodology can monitor both clicked and displayed advertisings. This unique advantage of the Network Intelligence methodology is particularly important because the click is not an accurate indicator of the effectiveness of online display advertisements ("*Wither the Click? How Online Advertising Works*" Gian M. Fulgoni, Marie Pauline Mörn, in Journal of Advertising Research, June 2009).

3.3. The Network Intelligence applied to mobile internet tracking

3.3.1. Overview

The Network Intelligence software is embedded into probes that are connected to the Gn interface of the GGSNs. In order to provide a comprehensive information tracking, the probes are connected to the Gn interface of all GGSNs installed on the network (typically between 5 and 15 depending on the operator/country).

The probes are programmed in order to analyse the IP traffic and extract from the IP flow the information that are required for the marketing research purpose (example: timestamp, URLs, user agent etc.).

Table 8 : Information analysis example: Deep Information Extraction

Incoming

Timestamp	URL Accessed	User Agent	Source IP address
1228226456	www.mobilelife.co.th	Nokia3100/1.0 (03.10) Profile/MI...	203.170.229.34
1228226456	www.mobilelife.co.th	Nokia6510/1.0 (04.12)	203.170.229.34
1228226456	www.mobilelife.co.th	Nokia3200/1.0 () Profile/MIDP-1....	203.170.229.34
1228226456	wap.bugmode.com	INNO90	203.170.229.34
1228226456	wap.th.samsungmobile.c...	SEC-SGHE710	203.170.229.34
1228226456	www.mobilelife.co.th	Nokia3100/1.0 (04.01) Profile/MI...	203.170.229.34
1228226456	www.mobilelife.co.th	SAMSUNG-SGH-E700/BSI UP.Br...	203.170.229.34
1228226456	mobileap.club.nokia.com	Nokia6100/1.0 (05.16) Profile/MI...	203.170.229.34
1228226456	www.mobilelife.co.th	MOT-C450/0A.03.61R MIB/2.2 Pr...	203.170.229.34
1228226456	wap.gmember.com	Nokia6100/1.0 (04.70) Profile/MI...	203.170.229.34
1228226456	wap.game.mfec.co.th:8086	Nokia3100/1.0 (03.10) Profile/MI...	203.170.229.34
1228226456	content.siam2you.com	Nokia6100/1.0 (04.03) Profile/MI...	203.170.229.34
1228226456	mms.mobilelife.co.th	INNO90	203.170.229.34

Outgoing

Timestamp	URL Accessed	User Agent	Destination IP address
1228226457	www.mobilelife.co.th	Nokia6610/1.0 (5.52) Profile/MID...	10.113.21.151
1228226457	wap.gambaro.co.th	Nokia6610/1.0 (4.28) Profile/MID...	10.113.22.77
1228226457	wap.mobilelife.co.th	SEC-SGHX430	10.113.22.72
1228226457	xhtml.espnstar.fantasylea...	Nokia3200/1.0 () Profile/MIDP-1....	10.113.17.130
1228226457	wap.game.mfec.co.th:8086	Nokia3100/1.0 (03.10) Profile/MI...	10.113.14.135
1228226457	mms.mobilelife.co.th	SEC-SGHV200	10.94.140.109
1228226457	www.mobilelife.co.th	SAMSUNG-SGH-E700/BSI UP.B...	10.113.20.233
1228226457	www.mobilelife.co.th	Nokia3100/1.0 (03.10) Profile/MI...	10.113.19.171
1228226457	www.mobilelife.co.th	Nokia6610/1.0 (4.28) Profile/MID...	10.113.15.235
1228226457	www.mobilelife.co.th	Nokia3100/1.0 (03.10) Profile/MI...	10.95.19.25
1228226457	www.mobilelife.co.th	MOT-V290/6.1.0.7 UP.Browser/6...	10.113.17.176
1228226457	httpgw.mobilelife.co.th	Nokia3650/1.0 SymbianOS/6.1 ...	10.113.20.23
1228226457	www.mobilelife.co.th	SEC-SGHX430	10.113.22.72

Source : Qosmos

The Network Intelligence data extraction enables production of reports of reliable and accurate fine-grained metrics covering a broad range of marketing analysis:

- consumer behaviour and usage: application usage, web visits & itinerary, downloads etc.
- traffic measurement: web sites visits and 3G TV programmes audience
- audience measurement: socio-demographic characteristics coupled with traffic measures
- advertising exposure: displayed and clicked ads

The Network Intelligence Solution is operational and has been tested on networks.
The Network Intelligence solution is non-intrusive

3.3.2. A non-intrusive solution

The Network Intelligence Solution is privacy-proof and complies with the legal and regulatory obligations.

The Network Intelligence Solution ciphers all confidential data such as source and destination IP address, as well as IMSI or IMSDN, using an encryption algorithm before the data is conveyed to the data warehouse. The anonymisation process is performed sequentially, attribute by attribute, data record by data record. The anonymisation is irreversibly applied to the data points. Anonymised data are analysed statistically, not individually. Confidential data never transit onto the network.

3.3.3. A methodology providing a two fold service proposition

- The mobile internet tracking methodology based upon Network Intelligence can provide the mobile operators with a powerful marketing information source for strategic internal Business Intelligence KPI's. Knowing the context of IP traffic usage enables telecommunication providers to differentiate service offerings and billing packages, improve Average Revenue per User (ARPU) and increase subscriber acquisition and retention by charging only for services that are actually used. It also improves their revenue management, and gives a better visibility into subscriber behaviour, allowing creation of more attractive and profitable service

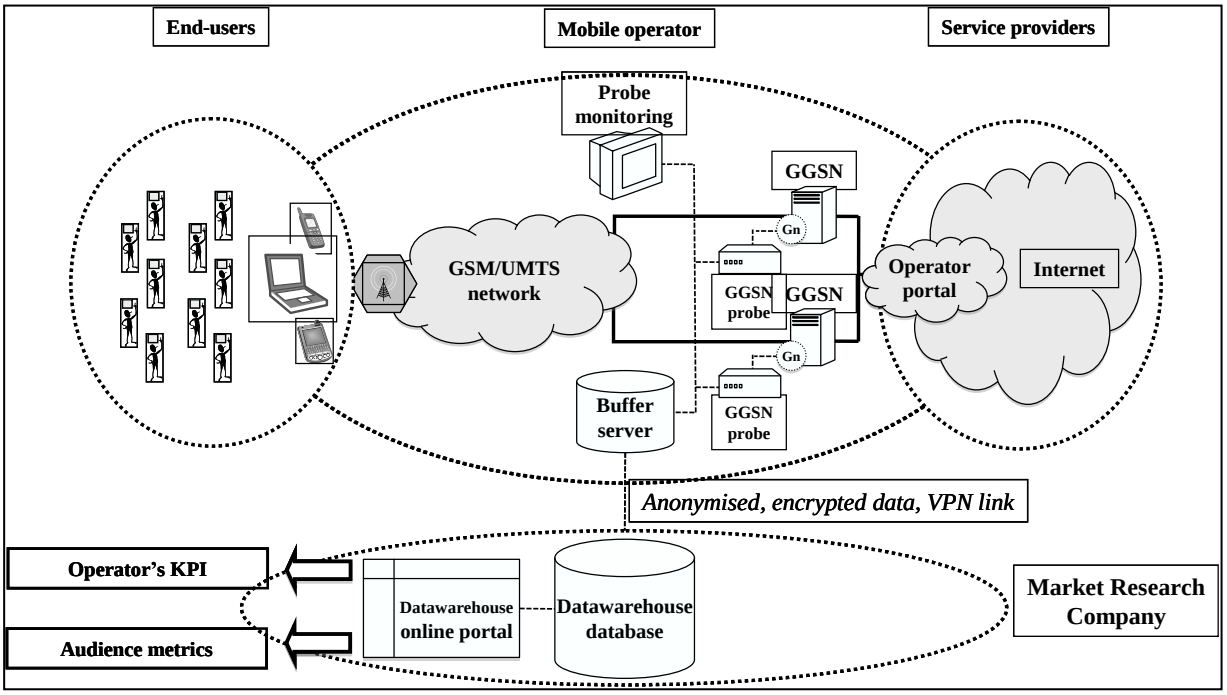
packages. The Network Intelligence solution is a very efficient tool for defining subscriber segmentation and measuring impact of marketing and advertising campaigns.

- The Network Intelligence Solution can also provide the fine-grained traffic and audience measurement that are demanded by the media and advertising sector. When this technology is installed on all the mobile networks in a country, the resulting audience reports become undisputable and outperform all other audience measures. In addition, the aggregation of marketing information from all networks provides a very valuable benchmarking tool to the operators.

3.3.4. Architecture of the Network Intelligence Solution

The cellular networks establish a bridge between the mobile subscriber and the internet services. Internet service usage can be measured from capture points located on the Gn interface, close to the GGSN's which are the servers where all IP traffic is transiting. Once the data are captured (and private information anonymised), data are transiting through a buffer server located in the operator premises and exported to the data warehouse of the Marketing Research company.

Table 9: Network Intelligence Solution (NIS) architecture



The Marketing Research company must have the capacity to store and process massive volume of data in order to cope with the rapidly growing mobile internet usage (more than one TB of data per day per GGSN is currently observed on some Western Europe networks). The metrics reports are provided through online portal and can be formatted according to the specific requirement of the client, whether they are internal Business Intelligence KPI's or Market Intelligence analyses.

3.3.5. socio-demographic characteristics

The Network Intelligence Solution provides the finest grained mobile internet traffic metrics and the advertisers, the Brands are expecting audience measurements enhanced with socio-demographic information.

This can now be delivered with a single source methodology based upon the following process:

Step 1: recruitment of a consumer panel representative of the mobile user universe. Each panellist allows the marketing researcher to track his mobile internet usage (web site visit itinerary, advertising exposure, purchasing activity etc.).

Step 2: the NIS extracts from the IP flow all information related to the mobile internet usage of the subscribers connected to the mobile network, including the "passive" consumer panel members.

Step 3: the consumer panel results are calibrating with the global market data and the audience metrics integrating socio-demographic characteristics can be published.

3.3.6. Marketing knowledge provided by the Network Intelligence Solution

The Network Intelligence methodology can produce an infinite number of metrics reports. The following table gives a picture of the main areas of research and of the most demanded metrics.

Table 10: Marketing research territories and metrics

Research Territories	Metrics
❖ **business performance monitoring and mobile space monetization**	- Portal efficiency (portal traffic, in-out flow) - Web site, page traffic analysis - Advertising exposure (displayed/clicks/clickthrough rate) - Segmentation-correlation analysis/pre paid-post paid (with operator sourced billing data) - Socio-demographic characteristics
❖ **subscriber usage and behaviour tracking**	- Subscribers itinerary - Search engines traffic - Queries (key words) - Geolocalization of mobile internet usage - Loyal versus occasional visitors - Socio-demographic characteristics
❖ **device portfolio management**	- Mobile phone ranking/time spent on mobile internet - Smartphone OS ranking/3G service usage
❖ **multimedia service adoption**	- Content download monitoring (on and off portal) - P2P and MMS traffic monitoring - 3G TV audience measurement IM (chat, data exchange, VoIP...)

The possibility of studying these territories and to measure the traffic online with the fine granularity are, to our opinion, the best bases of any marketing intelligence for the mobile web marketing.

3.4. Metrics

The Network Centric methodology enables the most comprehensive analyses and has the capability to provide the finest grained metrics reports (see appendix).

This methodology covers all the essential domains of the mobile internet marketing research territory:

- monitoring of the subscriber itinerary

- ✓ tracking of in-flow and out-flow to and from a given website (or portal), thus enabling to identify the preferred itineraries crossing a website, allowing targeted advertising on websites to increase traffic through a website etc.
- ✓ tracking of subscribers itinerary over a period

- measurement of web sites traffic
  - ✓ measurement of unique visitors traffic, of visits duration, with undisputable accuracy and reliability
  - ✓ average number of unique visitors to a website, hour per hour per day of the week etc.
  - ✓ classification of website traffic per category
- tracking of mobile handset usage
  - ✓ understand how mostly sold Smartphones are used, measure OS performance, target most appropriate content per type of Smartphone etc.
- analysis of advertising efficiency (banners, sponsored links)
  - ✓ measure number of displayed ads viewed by unique visitors for a given period, measure clicked ads and provide click-through rates etc.
- measurement of 3GTV audience
- tracking of internet usage geolocalization
  - ✓ reporting of internet usage by activity and location of the subscriber

And it opens new fields of investigation that will be used to develop future research territories. This is particularly the case of analyses driven by monitoring of research engine queries.

- tracking of top searched words
  - ✓ correlation analysis between queries (ex: brand names, product names) and advertising campaigns etc.

3.5. Monitoring internet traffic and usage from WiFi connexions

The NIS methodology used for mobile internet traffic measurement can be used for fixed internet. The data capture points, on fixed internet networks, can be located at different places (BAS, DSLAM, Hotspots aggregators etc.) depending on the objective of the measure.

Capturing information on BAS and Hotspots aggregators enables to ensure a comprehensive monitoring of internet traffic and usage from consumers using dual mode cellular-WiFi

mobile handsets, whether they are at home, connected to their residential gateway or on the move, connected to a Hotspot.

3.6. One of the 3 screens

Capturing data to monitor web site visits is done on a BAS while monitoring IP TV audience necessitates a probe connexion to the DSLAM's which are the terminal points, i.e. the closest points to the subscribers.

The NIS methodology can therefore provide a single source for cross media analysis, bringing to both fixed and mobile internet measurements the same benefits in terms of granularity, accuracy and reliability.
This, combined with audience measurement of fixed and mobile broadcasted TV will ultimately provide the advertisers and the Brands with the 3 screen audience analysis.

4. A NEW AREA FOR MARKET RESEARCH AND OPPORTUNITY FOR NEW RESEARCHES

The NIS methodology is opening a new territory for the marketing research industry.
It has the capability to report a comprehensive marketing information compatible with the very segmented world of internet with the guarantee of an optimum accuracy and reliability.
Applied to mobile internet, the NIS methodology provides the Brands with detailed consumer usage and behaviour analyses.
Beyond the marketing research domains described in this paper, particularly the consumer traffic on the web and the mobile phone advertising audience, the NIS methodology is opening a broad list of other marketing analysis capabilities. This covers in particular the following research areas that will be described in a future paper:

- online price-demand elasticity analyses
- merchandising analyses applied to the m-commerce and notably to the download of multimedia content.
- advertising pre and post-testing
- monitoring of MMS based viral mobile marketing
- consumer segmentation analyses

5. CONCLUSION

This paper focused on the very dynamic environment stimulating value creation in mobile internet and described the very favourable conditions for the development of an efficient new marketing tool. It described the benefits of the NIS methodology compared to alternative marketing research approaches. The NIS methodology can provide most of the marketing information required by the Telecom, the Advertising, the Media sectors and by all other participants to the mobile internet value chain. It offers also large perspective in terms of marketing research. Because of the breadth and depth of strategic information it can provide, the NIS becomes also a new and performing management tool.

The NIS methodology when linked to a single source process with a "passive consumer panel" is certainly the best way to measure correctly the advertising business of mobile phone (number of clicks, clicks rate, OTS: all these numbers produced by seconds and for different demographic groups). Moreover this method should be in the future the only one to give the possibility to measure precisely and online the cross media (mobile phone, web and IP TV).

The Brands which are progressively shifting advertising expenditure from offline to online medias are showing an increasing interest in mobile internet where they can establish a direct, closer contact with the consumer.
In this context, the NIS methodology will directly contribute to value creation in the mobile ecosystem. The NIS is a proven solution. It is being deployed on some major mobile networks and the first marketing reports based upon the NIS will be published before the end of 2009.

Appendix: some metrics reports

Monitoring traffic

Table 11: Inflow-outflow profile (example)

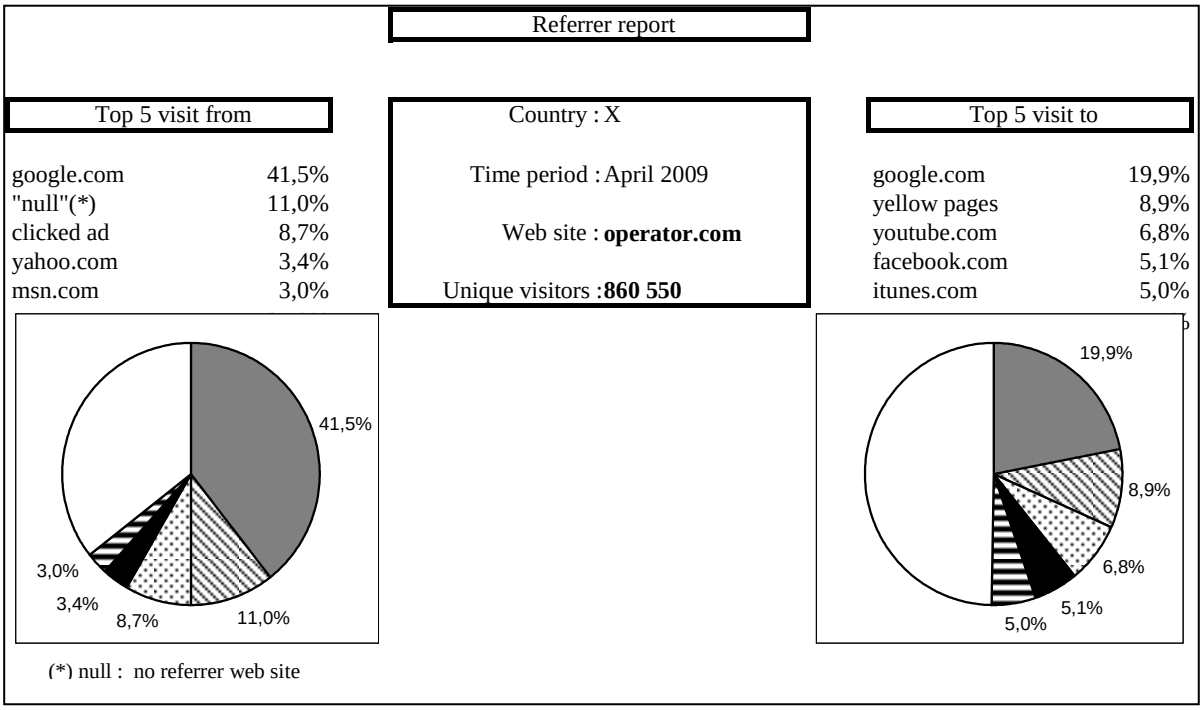


Table 12: Inflow profile (example)

Share of websites from which visits to a website are originating (referrer website)

week 14-2009		week 15-2009		week 16-2009		week 17-2009		april 2009	
google.com	42,5%	google.com	42,3%	google.com	39,7%	google.com	41,4%	google.com	41,5%
"null"	9,2%	"null"	10,3%	clicked ad	16,1%	"null"	13,9%	"null"	11,0%
clicked ad	6,2%	clicked ad	6,5%	"null"	10,7%	clicked ad	6,1%	clicked ad	8,7%
yahoo.com	3,5%	msn.com	3,2%	yahoo.com	3,2%	yahoo.com	3,5%	yahoo.com	3,4%
msn.com	2,9%	yahoo.com	3,1%	msn.com	2,8%	msn.com	3,2%	msn.com	3,0%

Table 13: Outflow profile (example)

Share of websites to which visitors of my website are leaving

week 14-2009		week 15-2009		week 16-2009		week 17-2009		april 2009	
google.com	42,5%	google.com	42,3%	google.com	39,7%	google.com	41,4%	google.com	19,9%
"null"	9,2%	"null"	10,3%	clicked ad	16,1%	"null"	13,9%	yellow pages	8,9%
clicked ad	6,2%	clicked ad	6,5%	"null"	10,7%	clicked ad	6,1%	youtube.com	6,8%
yahoo.com	3,5%	msn.com	3,2%	yahoo.com	3,2%	yahoo.com	3,5%	facebook.com	5,1%
msn.com	2,9%	yahoo.com	3,1%	msn.com	2,8%	msn.com	3,2%	itunes.com	5,0%

Table 14: Website traffic (example)

Average number of unique visitors to a website hour by hour per day over the week

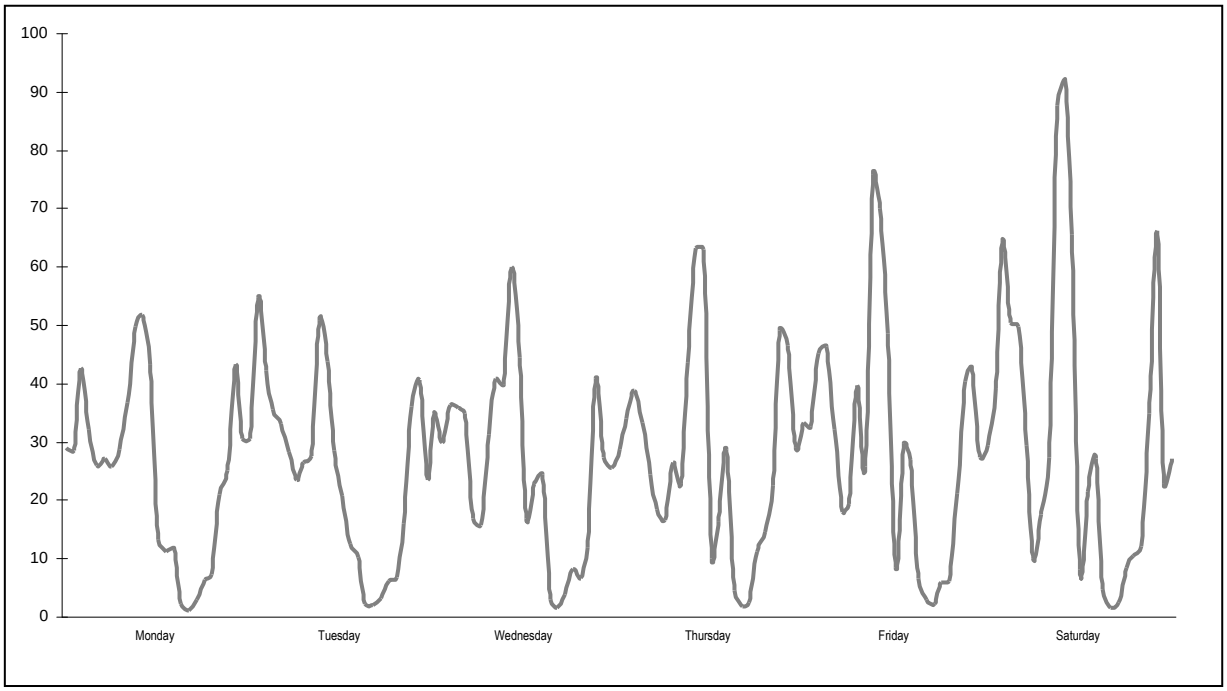


Table 15: Website traffic (from actual network extraction)

Number of visits over time. Identifying optimum advertising slots

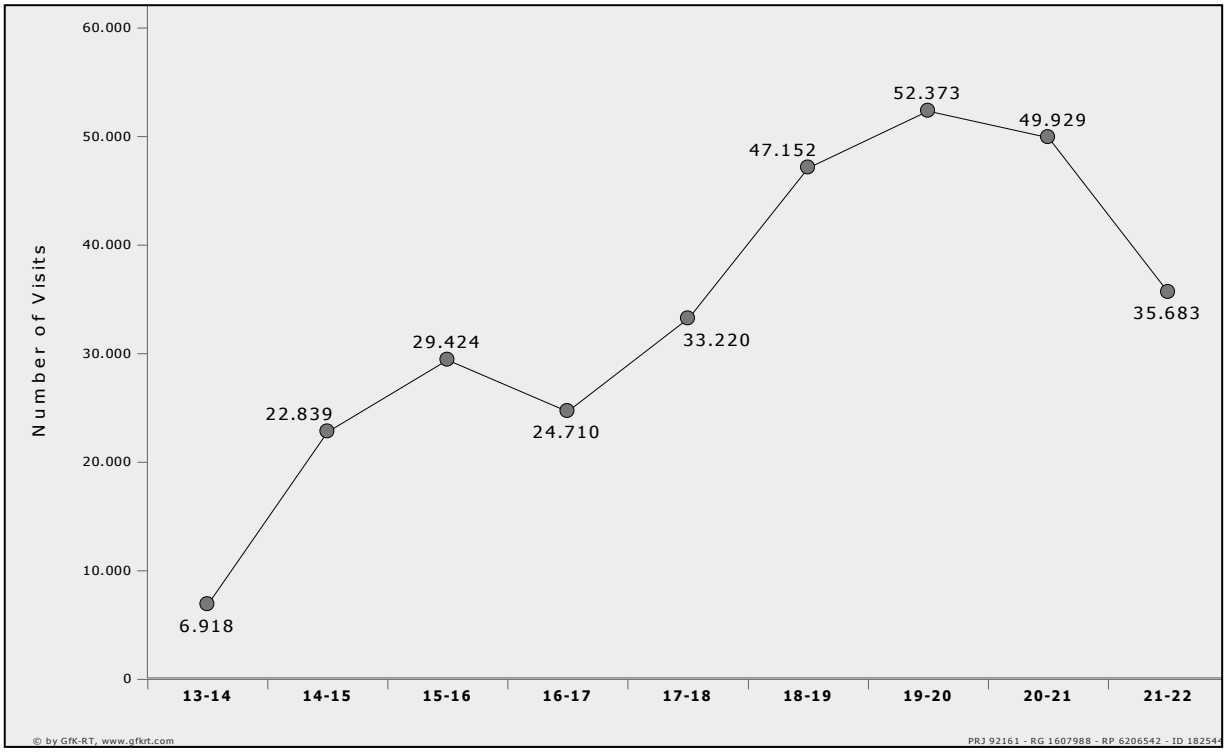


Table 16: Visit duration (example)

Average number of minutes spent daily on mobile internet per type of subscription

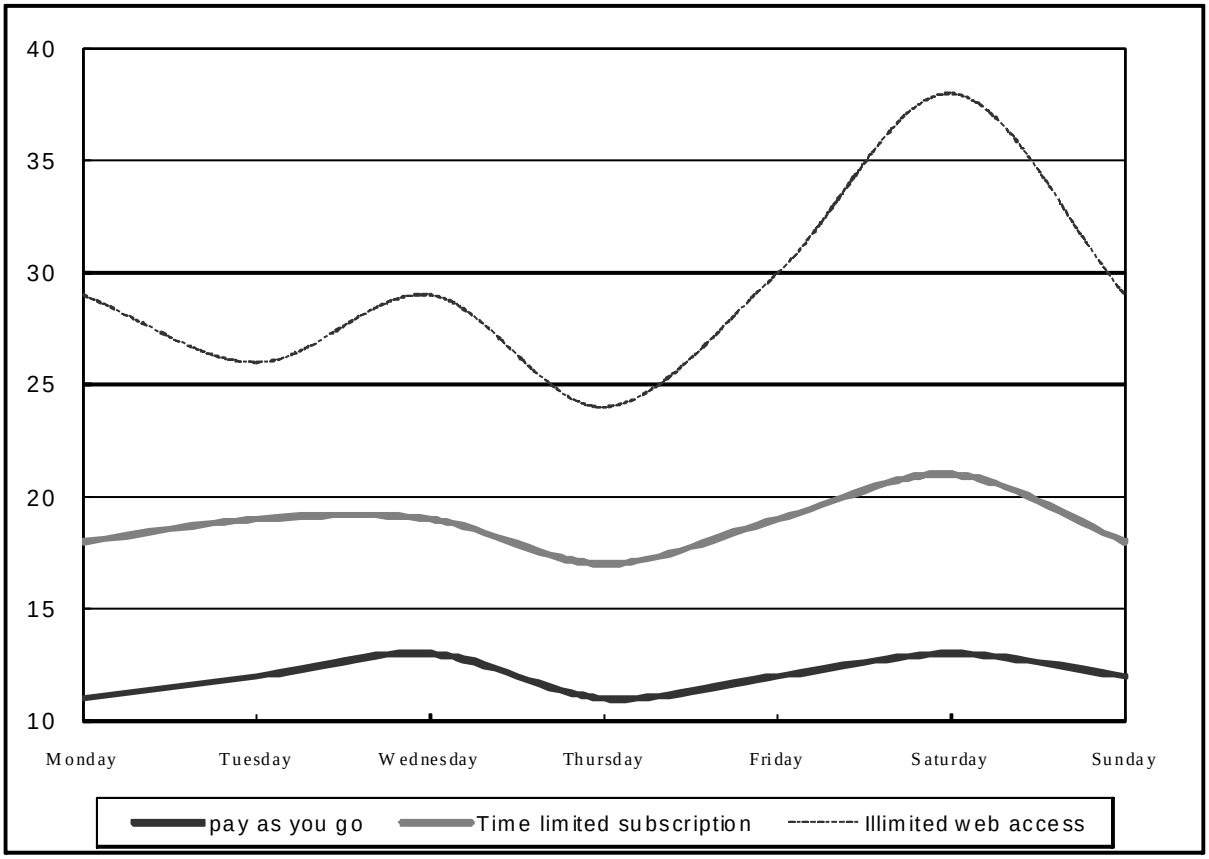


Table 17: Visit duration (from actual network extraction)

Average duration in seconds

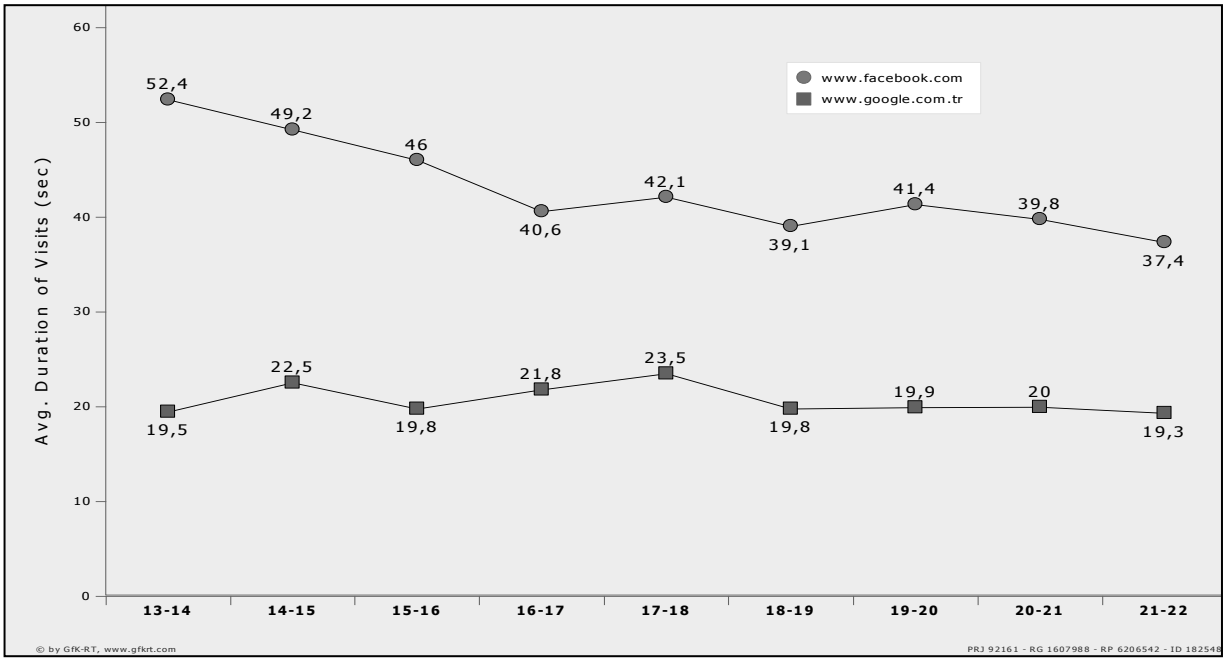
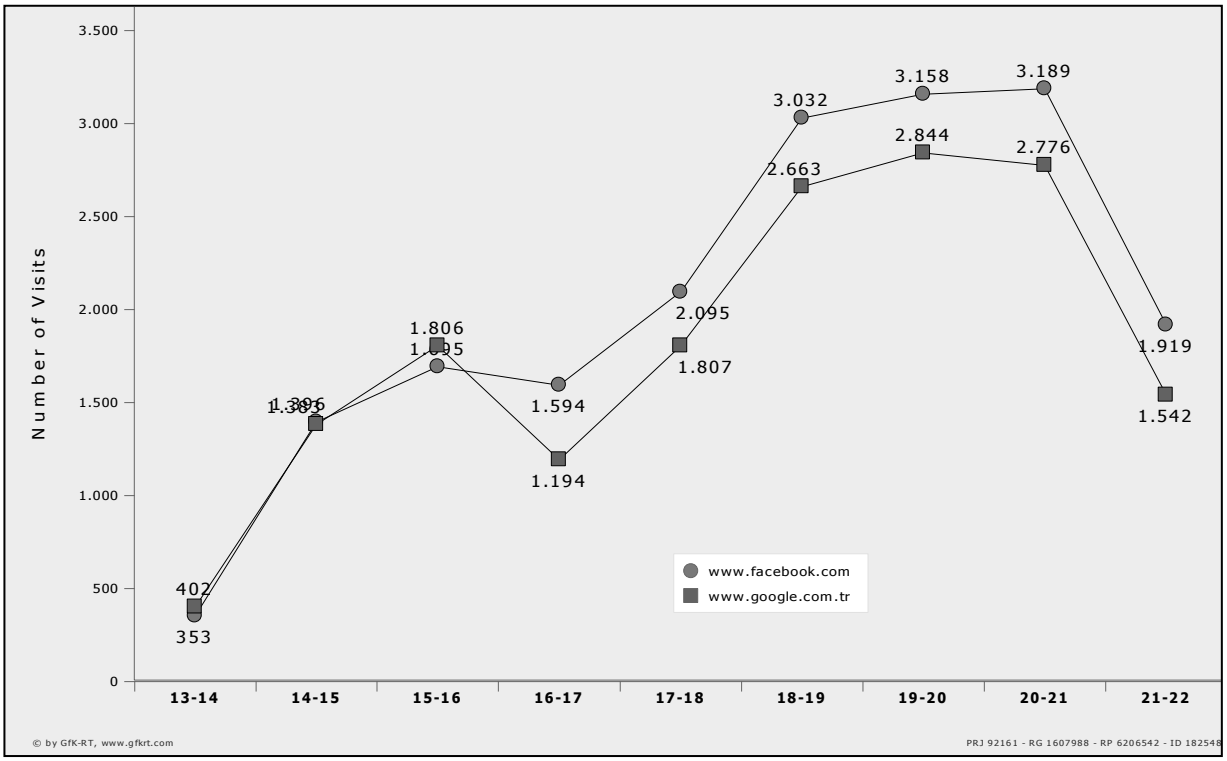


Table 18: Unique visitors (from actual network extraction)

Comparing top web sites performance over time



Monitoring traffic and advertising exposure

Table 19: Web site visits and advertising exposure (from actual network extraction)

Analysis per web site

	Number of Visits	Number of Visits	Number of unique Visitors	Number of Seen Pages	Avg. Duration of Visits (sec)	Number of Seen Ads	Number of Clicked Ad
<Grand Total>	295 853	100,0	14 054	1 302 206	20	101 160	1 331
www.facebook.com	18 010	6,1	3 486	143 862	42	6 329	65
www.google.com	16 105	5,4	5 315	41 269	21	5 572	71
googleads.g.doubleclick.net	14 892	5,0	2 733	49 249	21	5 173	82
clients1.google.com.tr	8 131	2,7	3 764	10 370	30	2 786	35
m.facebook.com	4 433	1,5	885	21 801	29	1 496	16
www.google.com	4 242	1,4	2 132	9 803	20	1 497	17
a.rad.msn.com	3 911	1,3	1 132	4 212	9	1 343	16
apps.facebook.com	3 703	1,3	649	11 332	14	1 330	25
b.rad.msn.com	3 477	1,2	1 042	3 888	13	1 169	18
mail.google.com	1 395	0,5	275	15 634	40	378	4
<Others>	217 554	60,4	12 223	811 847	18	74 087	982

Table 20: web site visits and advertising exposure (from actual network extraction)

Analysis per category

	Number of Visits	Number of Visits	Number of unique Visitors	Number of Seen Pages	Avg. Duration of Visits (sec)	Number of Seen Ads	Number of Clicked Ad
<Grand Total>	295 853	100,0	14 054	1 302 206	20	101 160	1 331
Portal	67 538	22,8	11 033	315 340	24	22 899	296
Social Networking & Forums	44 509	15,0	4 975	310 496	27	15 761	177
Publishing/ Information	32 654	11,0	4 513	110 829	14	11 512	146
Professional Services	19 742	6,7	3 206	72 033	19	6 925	115
Shopping/ Orders	5 865	2,0	1 083	51 954	23	2 016	33
Online Entertainment	3 546	1,2	963	32 593	35	1 306	23
Finance/ Property	1 378	0,5	542	11 893	23	548	9
Adult	376	0,1	43	9 128	25	93	3
Manufacturers	340	0,1	162	6 653	37	118	1
Other categories	119 905	40,5	9 368	371 817	17	39 955	528

Table 21: Advertising exposure (example)

Number of displayed ads viewed by unique visitor for a given week

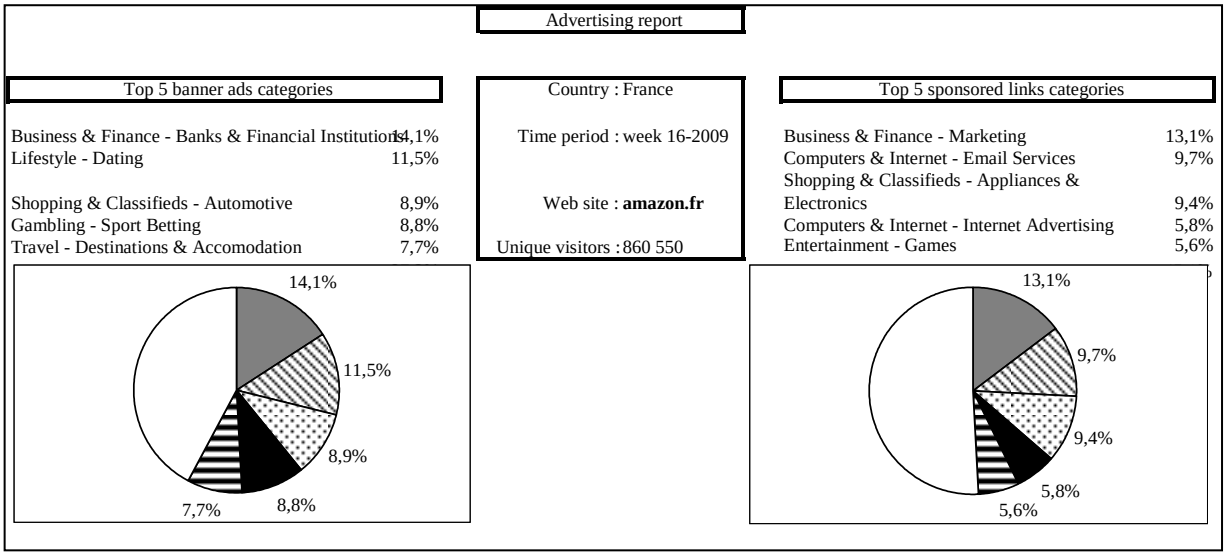


Table 22: Click through rate (from actual network extraction)

Measuring performance across sites, over time

		13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22
www.facebook.com	Number of Clicked Ads	1	5	6	7	7	3	14	22	3
www.google.com.tr	Number of Clicked Ads	5	4	14	8	5	12	12	6	5
www.facebook.com	Number of Seen Ads	140	437	525	441	791	1.010	1.177	1.180	708
www.google.com.tr	Number of Seen Ads	164	397	615	378	689	871	1.005	957	557
www.facebook.com	Conversion rate (clicked/displayed)	0,7	1,1	1,1	1,6	0,9	0,3	1,2	1,9	0,4
www.google.com.tr	Conversion rate (clicked/displayed)	3,0	1,0	2,3	2,1	0,7	1,4	1,2	0,6	0,9

Table 23: Ad efficiency (from actual network extraction)

Clickthrough rate by number of page views per unique visitors for a given ad

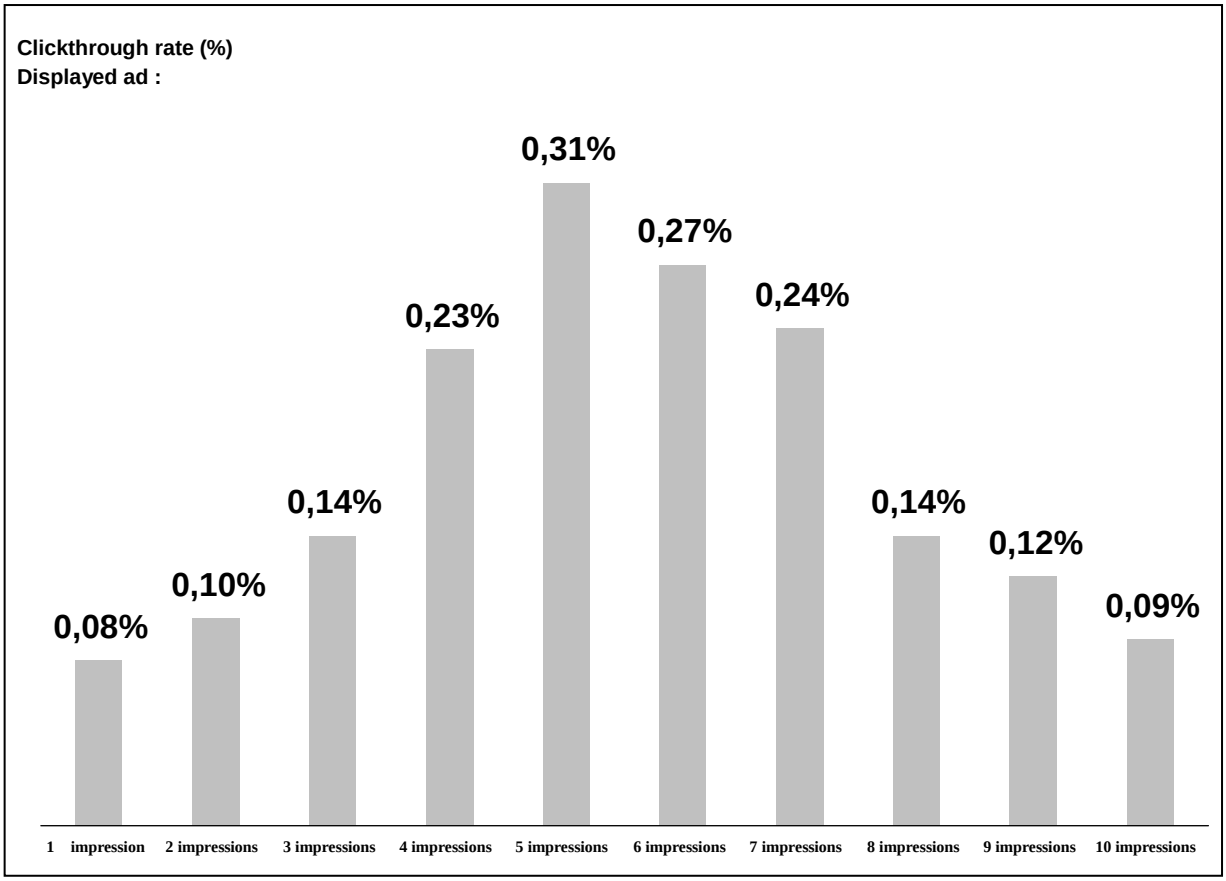


Table 24: Ad efficiency (from actual network extraction)

Comparing OTS and clicked rate of an ad over time

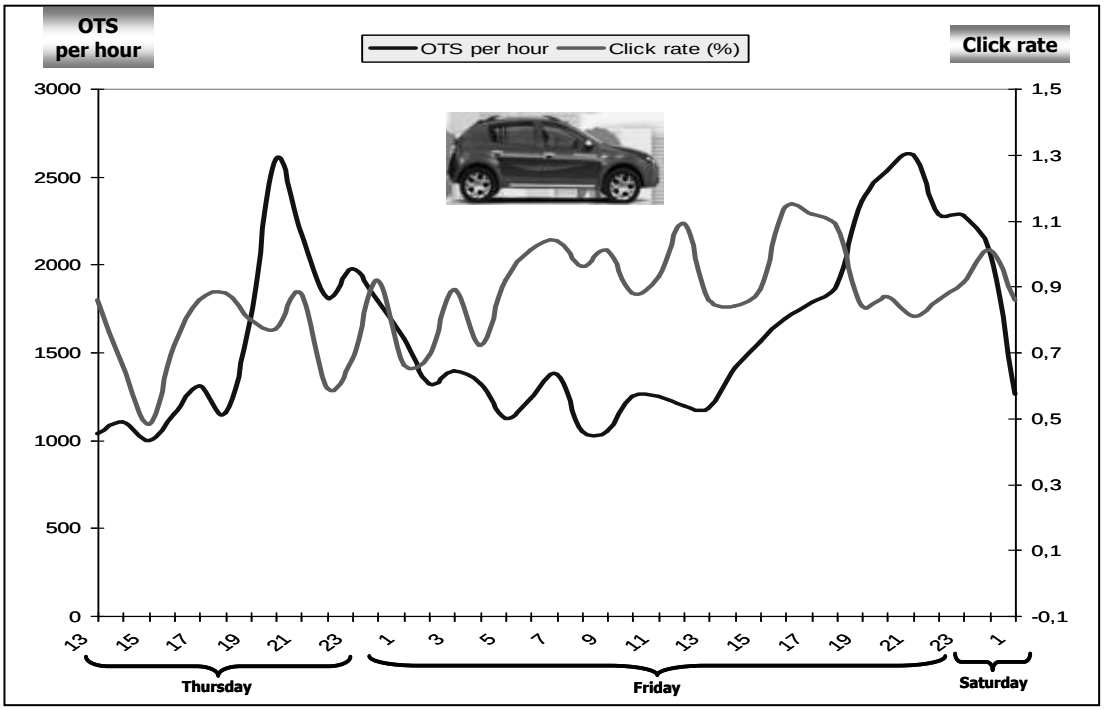
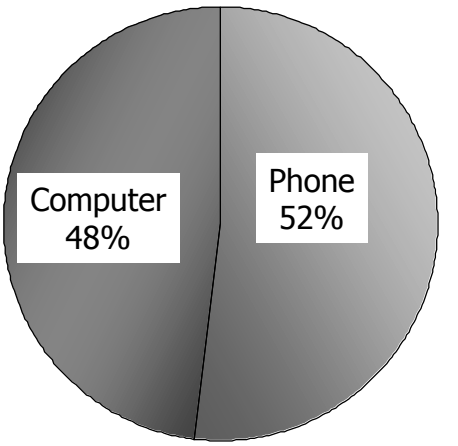


Table 25: Handset usage (from actual network extraction)

Measuring handset usage and 3G dongles



Top 10 Device	Visits
iPhone	16,6%
SAMSUNG SGH E250	13,7%
Nokia6300	5,6%
Nokia E63	3,5%
NokiaE71	2,9%
SAMSUNG SGH L700	2,7%
SAMSUNG SGH D900i	2,6%
Nokia3120classic	2,5%
SAMSUNG GT S5233A	2,2%
NokiaN95	2,0%

Monitoring handset usage

Table 26: Handset usage (from actual network extraction)

Product category usage over time

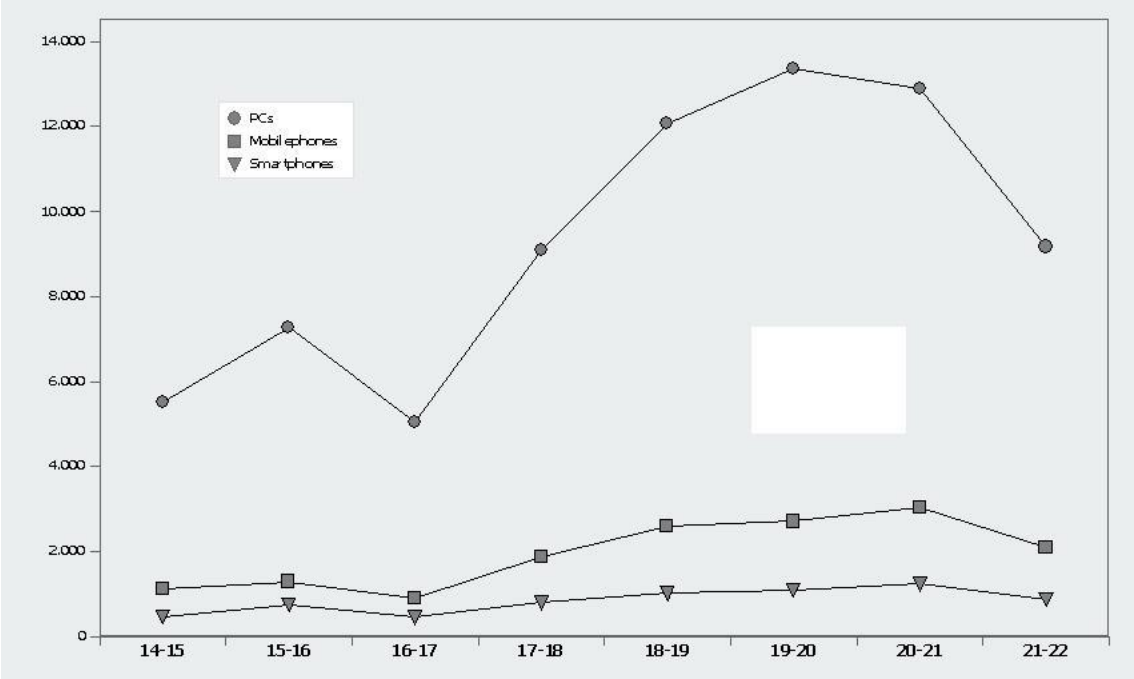


Table 27: Handset usage (from actual network extraction)

Monitoring handset usage by visits and advertising exposure

	Number of Visits	Number of Visits	Number of unique Visitors	Avg. Duration of Visits (sec)	Sum. Duration (h)	Number of Seen Ads	Number of Clicked Ad
<GT>	295 853	100,0	14 054	20	1 660,08	101 160	1 331
3G dongles	222 975	75,4	8 093	20	1 246,71	76 649	1 010
SAMSUNG,SGH-E 250	11 550	3,9	1 090	22	72,13	3 936	57
APPLE,IPHONE 2G 8GB	8 528	2,9	889	21	50,53	3 153	35
SAMSUNG,SGH-L 700	7 063	2,4	317	18	35,50	2 498	32
NOKIA,E63	3 071	1,0	265	20	16,85	1 010	8
NOKIA,E71	2 775	0,9	293	18	14,19	970	12
NOKIA,N95	2 478	0,8	165	17	11,84	781	10
NOKIA,N97	2 153	0,7	151	13	7,73	602	5
51795148,51795148	2 061	0,7	167	15	8,86	630	7
NOKIA,N95 8GB	2 015	0,7	116	15	8,58	573	12
Other handsets	31 184	10,5	2 755	22	187,17	10 358	143

References

Arce-Urriza M., Cebollada-Calvo J., "Loyalty Effects and Price Response at Online and Offline Channels: a Study accrossConsumer Packaged Goods Categories", *6th International Congress Marketing Trends,* Venice 21-23 January 2006

Fulgoni G.M., Mörn M.P., "Wither the Click? How Online Advertising Works", *Journal of Advertising Research,* June 2009

Hermet G., "A new challenge for Retail and Media: From Consumer Centric to Network Centric", *Internal GfK document, Germany,* May 2007

Hsieh C.., Jones C., Lin B., "The new business potential with mobile commerce", *International Journal of Mobile Communications,* 2008, Vol. 6, N° 4, pp. 436-455

Khurana S. "Mobile advertising campaigns: Precision like no other medium" *Paper published by the Mobile Marketing Association* 2009

Kivi A., "Measuring mobile service usage, methods and measurement points", *International Journal of Mobile Communications,* 2009, Vol. 7, N° 4, pp. 415-435

Kivi A., "Mobile Data Service Usage Measurements - Results 2005-2007" *TKK Helsinki University of Technology, Finland,* April 2008

Laszlo J., "The New Unwired World: An IAB Status Report on Mobile Advertising" *Journal of Advertising Research,* March 2009

Mooney A., Lin C. "Mobilizing sales" *Paper published by the Mobile Marketing Association,* 2009

Qosmos "Introduction to Network Intelligence Technology: how capturing data in motion enables smarter applications and services" *White Paper* July 2009

Xu H., Oh L.-B., Teo H.-H., "Perceived effectiveness of text vs. multimedia Location-Based Advertising messaging" *International Journal of Mobile Communications,* 2009, Vol. 7, N° 2, pp. 154-177

Acronyms

- ADSL Asymetric Digital Subscriber Line
- AFMM Association Française du Multimédia Mobile
- ARPU Average Revenue per User
- A-GPS Assisted Global Positioning System
- BAS Broadband Access Server
- DPI Deep Packet Inspection
- ETSI European Telecommunications Standards Institute
- Gbps/Mbps Gigabit per second/Megabit per second
- GGSN: GPRS Gateway Node
- GPRS Global Packet Radio Service
- HSDPA High Speed Downlink Packet Access
- HSUPA High Speed Uplink Packet Access
- IMEI International Mobile Equipment Identity
- IMSI International Mobile Subscriber Identity
- IP Internet Protocol
- KPI Key Performance Indicator
- LBA Location Based Advertising
- MMA Mobile Marketing Association
- MNO Mobile Network Operator
- MVNO Mobile Virtual Network Operator
- NFC Near Field Communication
- NIS Network Intelligence Solution
- PND Personal Navigation Device
- RFiD Radio Frequency iDentification
- UMTS Universal Mobile Telecommunication System
- VoIP Voice over Internet Protocol
- WCDMA Wideband Code Division Multiple Access
- WiFi Wireless Fidelity
- WiMAX Worldwide Interoperability for Microwave Access