STUDY IN SUPPORT OF A FUTURE INTERNET PUBLIC-PRIVATE PARTNERSHIP

The European Internet Industry and Market

DELIVERABLE 2

Appendixes

24 June 2011

SMART 2009/0044

Prepared for DG Information Society and Media

Contents

Table of figures

Table of tables

Appendix I: Methodology

1.1 Methodology of Supply Analysis: estimate of Internet Industry

1.1.2 Taxonomy of Internet Suppliers

The following definitions specify the taxonomy of the Internet suppliers analysed in this study.

- **Internet network equipment suppliers**

This segment includes the manufacturers of network equipment for both access and core Internet networks. This includes some of the main actors of the telecom market, including Cisco Systems and Nokia Siemens Networks, controlled by Nokia. There are also niche players, like companies specialized in testing equipment and networks (Rohde und Schwarz) and WLAN equipment manufacturers (like AVM).

Their offering includes the following products:

- Access network infrastructure: The access infrastructure market is made up of multiple elements that can be combined to provide multiple access topologies. Internet access elements are digital subscriber line access multiplexer (DSLAM), fiber, Ethernet access Devices (EAD) and some cable modem termination system (CMTS).
- Router and switch network infrastructure: It include IP core and IP edge routers, and metro aggregation equipments.
- Optical networks infrastructure: It includes long-haul DWDM, metro WDM, optical cross-connects and multiservice provisioning platforms..
- Voice over IP (VoIP) network infrastructure: VoIP infrastructure includes softswitch, media gateway, application servers and session border controller.
- Wireless and mobile network infrastructure: The wireless and mobile infrastructure space consists of two broad segments: mobile infrastructure that is anchored in public cellular network architectures in the 3GPP and 3GPP2 road maps and broadband wireless that includes WiFi (including WiFi mesh) and WiMAX. 2G infrastructures are excluded.
- OSS and billing systems: Operational support systems and billing systems provide fulfillment, assurance, and billing functions to operate, plan and administer Internet networks.

- **Smart handheld device providers**

This segment includes only the manufacturers of smart handheld devices and devices whose main purpose is to gain access to the Internet, or who are dependent on the Internet to function. This includes obviously Nokia, Apple, Research in Motion and others such as Dell (but only for their equipment dedicated to the Internet, not for their general PC business).

- **Internet-related hardware providers**

They include servers and storage (Cloud servers and storage) providers. For the most part, servers and storage are hard to classify as purely Internet-related and a full inclusion of all hardware in this category would make the scope of the Internet market too broad and therefore meaningless. Therefore we include here only the provision of storage and servers as cloud services (virtual or physical).

- **Internet-related software providers**

Software is defined as packaged software, whereas custom developed applications, adaptations, front-ends or interfaces are considered services. Most of the Internet interfaces that enterprises and government organizations develop to their applications to enable interaction with consumers and citizens are custom developed, and are therefore considered to be part of the services industry segment, rather than the software industry segment. For business-to-business interaction, many interfaces have already been developed as part of standard industry-specific solutions and are therefore counted as software. Main actors include SAP, Symantec, and Checkpoint. The following paragraphs specify what is included and what is not included in the study definition.

Internet software can be divided into two main types:

- Software "tools" that are used to create, manage and enable the Internet. This will include system management, network management, cloud infrastructure and platform software, but also server clustering, storage security, streaming software etc.
- Applications accessed by end-users, be they business users or consumers.

Within applications, the software can be used in three different ways:

- Internet native, developed for the Internet, such as Facebook, salesforce.com etc. **This is included in the study scope**.
- Non-Internet applications that have an Internet front-end allowing transactions, such as ticketing solutions, internet-banking etc. **In this study, only the Internet-related part is included**, i.e. the front-end and - if relevant - the client.
- Non-Internet applications that are neutral to the underlying network transport mechanism, meaning that they may or may not use the Internet for access, but do not offer any specific Internet facilities. **These are not being included unless a specific web client is used**. In these cases, the web client will be included. These are the typical business applications, such as SAP ERP, Lotus Notes etc.

Within software tools a similar distinction can be made between:

- native Internet software enablers (**included in this study**), such as cloud infrastructure and cloud platform software
- software, which may be used as Internet tools, but primarily serve as tools for other purposes (**the proportion relevant to the Internet is included, based on estimates**). An example here is IBM Tivoli.

Within the above definitions, we have covered – and will include – SaaS (software-as-a-service) and cloud software services.

- **Internet-related Services companies**

Internet-related Services companies assist customers in a broad range of activities from consulting and design of ICT solutions, through implementation to support and day-to-day operations of ICT infrastructure and application environment. In this study, only service companies activities related to design, implementation, management and support of Internet-related projects and operations are included. These activities could involve design and development of customised Internet interfaces that enable interaction between a company or organization to its customers. It can also include assistance in helping a company to determine its cloud strategy and integration via an Internet interface between existing applications and Software as a Service application. It can further include cloud business services, which are business and transaction services provided as a service, which is a subsection of the business process outsourcing (BPO) market. Main actors include Cap Gemini and Accenture.

- **Internet related telecommunication providers**

This includes all the operators providing voice, data, and managed network services via fixed or wireless networks to business customers. Revenue for these services is derived primarily from subscriber usage and fixed monthly recurring fees. The Internet revenues estimates include only the services directly related with the Internet.

ISPs (Internet service providers) provide access to the public Internet from residential or business locations, using any of several access or 'last mile' technologies (including DSL, cable modem, dialup, leased line, fibre or fixed-wireless) that may be provided by the ISP itself or that may already exist at the customer site. ISPs typically provide an email service, domain registration, and hosting and security services in addition to Internet access.

Web hosting companies provide customers with access to a Web server housed at its own or a partner's facility, in order that the customer can design and store Web sites and make them available on the Internet. Typically the hosting provider owns the server and related equipment and rents access to it to the customer on a recurring basis. The server may physically be dedicated to one customer or may be shared between multiple customers. The customer is able to control and manage the server at a specific level, from low (the customer has access to the whole server; typically referred to as server hosting) to high (the customer provides its Web site content and the hosting provider manages everything else).

Both ISPs and Web hosting operators' revenues are fully included in the Internet Industry revenues calculation.

Related segments include the following categories:

- Internet access: They include narrowband and broadband connections paid for and used by both consumers and businesses.
- IP-Voice: IP voice services refer to any voice service that is based on and carried over an Internet Protocol (IP) network. This type of transmission describes voice traffic sent over a public managed IP network or the Internet that is designed to complement or compete with public switched telephone network (PSTN) traffic.
- Ethernet services: they consist in or retail transparent-LAN (T-LAN) Ethernet services.
- IP-VPN: IP-VPN is a partitioned VPN running over a shared IP network, which is either the Internet or a managed IP network.
- Mobile data: Mobile data reflects the use of data communications over public cellular services. Not included is movement of data over WiFi or private mobile networks. SMS and MMS are also excluded.
- IP TV: Total household spending to manage TV services delivered over a broadband connection, typically DSL or fiber to a TV set. Connections to TV services to a PC or other non-TV device are not counted. Unmanaged services, provided over the top, are not included.
- Digital content: This represents the market for content services (music, video, gaming) delivered over a broadband connection
- Web hosting: Standard shared Web hosting services (i.e. multiple customers share a physical server). Includes recurring fee covering rental of server and storage, bundled, managed software (at a minimum OS and Web server), standard service management features (e.g. control panel, patching, security), bundled bandwidth, and other features that are routinely bundled (e.g. mail inboxes, domain names, etc.). Dedicated services web hosting offers the same service but on a dedicated server.
- The Internet world includes also operators of peer to peer exchanges that are responsible of a voluntary interconnection of administratively separate Internet networks for the purpose of exchanging traffic between the customers of each network. The pure definition of peering is settlement-free or "sender keeps all", meaning that neither party pays the other for the exchanged traffic; instead, each derives revenue from its own customers. Marketing and commercial pressures have led to the word peering routinely being used when there is some settlement involved, even though that is not the accurate technical use of the word. Public Internet Exchanges include actors such as LINX Ltd., AMS-IX, DeCix and others. They play an important role in the Internet world, but their revenues are very small, so they do not appear in the Top-100 vendors list.

1.1.2 Estimating Revenues

The supply side analysis was based on:

- IDC's databases on the ICT industry, specifically the Worldwide Black Book
- An ad-hoc analysis of a sample of 100 European Internet vendors, ranked by revenue size

The Worldwide Black Book is IDC's quarterly analysis of the status and projected growth of the worldwide ICT industry in 54 individual countries, providing end user spending for the main ICT technologies for the current year and 5 years forecasts. As the benchmark for consistent, detailed market data across six continents, the Worldwide Black Book offers a profile of the ICT market in each of the countries where IDC is currently represented, covering hardware, software, IT services and telecom services.

The methodological approach was the following:

- Definition of the Internet Industry as a subset of the ICT Industry, based on the identification of the technologies and services included and excluded, based on IDC's taxonomy;
- Identification of a long list of 200 relevant suppliers covering all the identified industry segments and responding to the criteria indicated below;
- Review of the selected vendors, based on desk research and IDC's data, and selection of the 100 top vendors in terms of Internet-related activity;
- In-depth analysis of the Top-100 vendors, based on desk research and interviews with approximately a third of them, gathering detailed data about their global and Internet-related revenues, competitive strategies and market positioning;
- Ranking and profiling of the Top-100 vendors (presented in Appendix 2 of this deliverable);
- Calculation of their global Internet-related revenues for the year 2009 and estimated for 2010;
- Calculation of the total EU27 Internet Industry revenues, for the period 2009-2014, building on the analysis of the top vendors and on the Blackbook data on the total ICT market;
- Qualitative analysis of the industry suppliers' characteristics, including SWOT and main technology trend affecting the industry and the market.

The Top-100 companies were identified based on IDC's extensive database of the ICT industry actors active in the EU27. IDC selected a "long list" of approximately 200 companies covering all the industry segments identified and from this select the Top-100. Important companies (e.g. Google) that failed to make the list due to business model specificities were included in the qualitative description and analysis of the industry. The list was discussed and validated by the consortium partners.

There are various ways to define 'top' firms corresponding to definitions of the Internet sector itself. The approach taken here is based on Internet-related revenues. Companies considered meet two key criteria:

- Operating in whole or substantial part within the European Internet Industry as defined by the study (the Internet does not have to be its main or sole core business);
- Having a substantial European presence (headquarters, production, distribution and/or research facilities).

The interviews were carried out by experienced analysts, on the basis of a common interview protocol reviewed by the IDC team leader. Profiles were crosschecked and reviewed to insure homogeneity of approach and quality control.

For each vendor profiled, the following items were compiled:

- Country of company corporate headquarters
- Company ownership
- Total number of employees (and % of global workforce)
- R&D investments as % of total global revenues
- Location of R&D facilities
- Internet-related revenues in the EU and % of total revenues
- Internet-related revenues by EU27, DE, FR, IT, ES, PO and UK
- Target customer base and % split of EU revenues
- Flagship product/service
- Internet relevant partnerships

1.2Methodology of Demand analysis: Estimate of Internet Market Value by Industry (Vertical Market)

IDC's Vertical Markets Sizing and Forecasting Methodology is based on a demand-side approach. The approach can be described in three major steps, as follows:

- Step 1: with the objective of sizing each vertical market's ICT spending, Internet-related spending and its breakdown by technology, leveraging IDC's primary research efforts
- Step 2: with the objective of developing trends and forecasts on investment dynamics by vertical industry and technology
- Step 3: with the objective of reconciling the bottom-up approach results with supply side research

Step 1: Bottom-Up Vertical Market Internet-related Spending Sizing

Step 1 foresees the following activities:

- the analysis of demographic information on a vertical market; size and country level (universe of ICT users)
- the results of IDC's European Vertical markets survey
- the extrapolation to the Universe of Vertical ICT spending estimates
- the breakdown by technology category to assess spending related to Internet technologies as defined by the study

Once collected demographic information, survey results were applied to get to an estimate of the total ICT market. Average spending at the unit company level was multiplied to the number of applicable cases in the size band. The number of applicable cases was obtained by applying occupancy/penetration rates to the number of companies/institutions from universe business demographic databases. The resulting figures for each size band and each vertical market were then summed up into preliminary vertical markets totals.

An initial validation took place at this point. The totals were mapped to the number of employees by vertical and GDP by vertical in each country. These two indicators have been tracked by IDC over time, and provide a useful validation to make sure that the obtained estimates are consistent with the economic contribution of each vertical industry to the economy.

The preliminary ICT spending data by vertical was also crosschecked with other available information on the size of the ICT business in each vertical market such as:

- Vertical market association ICT spending censuses
- Top ICT suppliers' revenue breakdown by vertical markets
- Published ICT budgets in the top organizations in selected vertical markets

Where insufficient primary surveys are carried out to fulfil the need for statistically reliable indicators, the analysts looked for proxies derived from surveys among comparable sets of users in terms of economic/cultural/technical attitudes and conditions.

ICT budgets in each vertical market were broken down by technology according to the average breakdown proportions calculated from the survey results in each size band, or according to past (up to two-year-old) average survey results, depending on the scope of the survey in each country. The survey investigated the broad split among hardware, software, IT and telecommunications services and further splits on telecommunications data services, Software as a Services and cloud computing, Web-enablement of applications, etc., all key technologies defined as part of the Internet industry.

Step 2: Bottom-Up Vertical Market Internet-related Spending Trends and Forecasts

After sizing year 1 in step 1, step 2 was aimed at producing forecast by technology up to 2014.

The growth by product and service type within each vertical market was based on:

- A combination of survey results and detailed analysis of drivers/inhibitors in the industry for the short term
- Vertical experts' views and expectations on key drivers for the vertical industry, based on business, technology, and geopolitical considerations at a country/regional level

Short-term Trends

For the next 12 months, the outlook was typically based on:

- The same/very similar growth rates emerging from end-user surveys wherever it is derived with enough reliability
- Consideration of industry-specific short-term climate/confidence surveys

- Views of industry-specific IDC analysts

Medium and Long-term Trends

For the medium/long-term, the analysts' assumptions were developed for based on several views, including:

- Growing penetration of new technologies and strengthening/weakening of innovation attitudes
- Substitution/upgrades of specific technologies tied to overcoming specific pain points or business challenges or to complying with regulatory requirements
- Status of competition (normally acting as an ICT spending driver if it rises)
- Emergence of killer applications for the industry
- Evolution in the role/impact of specific technologies in enhancing industry-specific processes
- Major business climate changes or evolution in the industry structure due to major mergers and acquisitions (M&As)
- Vertical industry associations or government surveys on expected technology adoption trends

Step 3: Top-Down Validation/Reconciliation with Supply side data

The resulting trends by technology for vertical market totals in a country were then crosschecked with the developments in technology acceptance anticipated by IDC's technology experts in their definition of the Internet industry.

Table 1: Definition of the Industry Sectors Used in the Demand Analysis

	ISIC Rev. 3 code	GINFORS Sector	Industry Sector Used in D2
1	1+2+5	Agriculture, hunting, forestry and fishing	Manufacturing, Construction and Primary
2	10+11+12	Mining and quarrying (energy)	Manufacturing, Construction and Primary
3	13+14	Mining and quarrying (non-energy)	Manufacturing, Construction and Primary
4	15+16	Food products, beverages and tobacco	Manufacturing, Construction and Primary
5	17+18+19	Textiles, textile products, leather and footwear	Manufacturing, Construction and Primary
6	20	Wood and products of wood and cork	Manufacturing, Construction and Primary
7	21+22	Pulp, paper, paper products, printing and publis	Manufacturing, Construction and Primary
8	23	Coke, refined petroleum products and nuclear f	Manufacturing, Construction and Primary
9	24ex2423	Chemicals excluding pharmaceuticals	Manufacturing, Construction and Primary
10	2423	Pharmaceuticals	Manufacturing, Construction and Primary
11	25	Rubber and plastics products	Manufacturing, Construction and Primary
12	26	Other non-metallic mineral products	Manufacturing, Construction and Primary
13	271+2731	Iron & steel	Manufacturing, Construction and Primary
14	272+2732	Non-ferrous metals	Manufacturing, Construction and Primary
15	28	Fabricated metal products, except machinery a	Manufacturing, Construction and Primary
16	29	Machinery and equipment, nec	Manufacturing, Construction and Primary
17	30	Office, accounting and computing machinery	Manufacturing, Construction and Primary
18	31	Electrical machinery and apparatus, nec	Manufacturing, Construction and Primary
19	32	Radio, television and communication equipme	Manufacturing, Construction and Primary
20	33	Medical, precision and optical instruments	Manufacturing, Construction and Primary
21	34	Motor vehicles, trailers and semi-trailers	Manufacturing, Construction and Primary
22	351	Building & repairing of ships and boats	Manufacturing, Construction and Primary
23	353	Aircraft and spacecraft	Manufacturing, Construction and Primary
24	352+359	Railroad equipment and transport equipment n	Manufacturing, Construction and Primary
25	36+37	Manufacturing nec; recycling (include Furniture	Manufacturing, Construction and Primary
26	401	Production, collection and distribution of elect	Utilities
27	402	Manufacture of gas; distribution of gaseous fue	Utilities
28	403	Steam and hot water supply	Utilities
29	41	Collection, purification and distribution of wate	Utilities
30	45	Construction	Manufacturing, Construction and Primary
31	50+51+52	Wholesale and retail trade; repairs	Distribution
32	55	Hotels and restaurants	Distribution
33	60	Land transport; transport via pipelines	Transport and Logistics
34	61	Water transport	Transport and Logistics
35	62	Air transport	Transport and Logistics
36	63	Supporting & auxiliary transport activities; activ	Transport and Logistics
37	64	Post and telecommunications	Telecommunications (Post in Business servi
38	65+66+67	Finance and insurance	Financial Services
39	70	Real estate activities	Business services
40	71	Renting of machinery and equipment	Business services
41	72	Computer and related activities	Business services
42	73	Research and development	Business services
43	74	Other Business Activities	Business services
44	75	Public administration and defence; compulsory	Government
45	80	Education	Healthcare/Education
46	85	Health and social work	Healthcare/Education
47	90-93	Other community, social and personal services	Business services
48	95+99	Private households with employed persons & e	Business services*

Source: IDC 2010

1.3The Digital Marketplace Model and Forecast (DMMF)

The data on Internet users, Internet buyers, and eCommerce revenues presented in this report are based on IDC's Digital Marketplace Model and Forecast (DMMF). Launched in 1995 and substantially redesigned and updated in 2008 to expand the view of users' activities. Similarly to IDC's Blackbook, the DMMF leverages IDC primary research on ICT demand and supply,

The current version of the DMMF incorporates updated install base information for PCs, Internet Access Devices, and Mobile devices from IDC's worldwide Tracker teams, updated macroeconomic data from IDC's *Project Galaxy* and the results of several primary research efforts conducted around the world. Now in its 14th year, the methodology for the DMMF was able to incorporate detailed regression analysis conducted on a per country basis to better understand how historical growth may influence Internet forecasts.

The following factors provide key input to the model:

- Installed base for PCs and online games
- Number of users per device
- Amount of time users spend on the Internet
- Number of buyers
- Value of user purchases on the Internet

IDC believes that the DMMF offers a unique Internet market perspective that includes not only the industry's deepest and most detailed understanding of IWeb demographics and behaviour but also the industry's most comprehensive knowledge of the total available market.

The underlying premise of the DMMF is that the number of web users is best determined by applying the results of demand-side primary research on access and use to installed-base forecasts generated by supply-side research.

The forecast includes the following implicit assumptions:

- No catastrophic failure of the Internet will occur.
- Security on the Internet, as well as consumer confidence, will continue to improve slowly.
- The web will become an increasingly common mode of communication and information for users around the world

As fresh research comes in - for example, as a result of local country studies or new device forecasts - that information is fed into the model for the next release. The latest release of the DMMF has added country level detail to the web 2.0 (Web activities) and Internet advertising sections.

Internet Usage by Segment

IDC's Digital Marketplace Model and Forecast (DMMF) reports global Internet usage not only within geographic regions but also within the following market segments:

- Home (including home office)
- Small business (1-99 employees)

- Medium-sized or large business (at least 100 employees)
- Government (federal, state, and local)
- Education (K-12 and higher)
- Mobile (users accessing the Internet via a mobile device across a wireless network)

Segments are defined by the location of the device used to access the Internet. For example, a person accessing the Internet from a PC located in the home would be considered a home user, even if his or her Internet use was work-related. Conversely, a person accessing the Internet from a small business location is considered a small business user, even if his or her Internet access is for personal use. Mobile was added as a sixth segment in ICMM version 7.1 because a mobile device is not tied to a physical location and therefore does not fit the definition of any of the other segments.

The DMMF looks at devices and users separately. Devices are allocated to only one segment. Even portable devices are assigned to the segments in which they are predominantly used. Users, on the other hand, may be assigned to multiple segments. It is not uncommon for an individual to use the Internet at home, at school, and at work. In order to accurately reflect this usage pattern, users can be assigned to multiple segments. However, because IDC does not want to inflate the total number of actual Internet users by double-counting individuals who access the Internet from, say, home and work, the total number of Internet users has been adjusted. What this means, therefore, is that the sum of all Internet users reported in each segment will be greater than the (adjusted) number of total Internet users.

1.4Glossary

The following IDC definitions are relevant to this report:

- **PC installed base:** This includes all PCs installed, including desktops and notebooks, regardless of age, processor type, or Internet capability.
- **Internet access device (IAD) installed base:** The definition of IAD changed in version 11.1 and now include online videogame consoles ONLY. These include devices such as Sony's PS3 and MS Xbox. Past versions of the ICMM included thin clients and information appliances such as Net TVs, screen phones, Web terminals, email terminals, etc. in this category. These devices are no longer included. Given this new definition, all IADs are now reported in the home segment.
- **Mobile Devices installed base:** Mobile devices are defined as devices that accesses the Internet across a 2, 2.5 or 3G cellular networks (e.g., GSM, GPRS, EDGE, CDMA, UMTS, HSDPA, WCDMA, etc. This includes mobile phones, converged devices and Wi-Fi-enabled handhelds. To meet the definition of Internet device in the ICMM, the mobile device must be used to access the Internet at least once per month.
- **The Internet:** The Internet is the TCP/IP-based interconnection of servers worldwide. It provides communication and application services to an international base of business, education, research, government, and other organizations as well as individuals. It is loosely governed by the Internet Society, with standards

developed by the Internet Engineering Task Force. Other volunteer groups and vendors also support the Internet.

- **Internet use:** A device must be used to access the Internet at least once per month. This is a percentage of the devices captured in the installed base.
- **PC/IAD Internet user:** A PC/IAD Internet user is a person who accesses the Internet at least once per month through a PC or IAD. There is no age limitation for such a user. An Internet user may access the Internet from anywhere - home, work, an Internet café, a school, a library, and so on.
- **Mobile Internet user:** A mobile Internet user is a person who accesses the Internet at least once per month from a mobile device as described above. The user must use the service at least once per month. There is no age limitation for such a user.
- **Internet hours:** These are the number of hours a person is actively engaged in using the Internet on a PC, IAD, or mobile device. Hours that the Internet is "on" but not being used are not counted.
- **Internet buyer:** An Internet buyer is a person who commits to purchase a product or service from a potential seller by clicking an order button on the Internet, representing a commitment to transfer funds in exchange for the goods or services.
- **Commerce:** Commerce is the process by which an order is placed or accepted, therefore representing a commitment for a transfer of funds in exchange for goods or services. The measure of commerce includes the value of final goods/services purchased for consumption by consumers/business (e.g., a car) and the intermediate goods/services purchased by businesses to be incorporated into the product offering (e.g., tires purchased and resold as part of a car by an auto manufacturer). Commerce is not measured in the ICMM; it is defined here for reference.
- **Internet-assisted commerce:** Internet-assisted commerce is the dollar value associated with commerce resulting from using the Internet to gather information, identify the buyer, negotiate a price or product feature, or actually order the product/service. For example, if a potential buyer provides his or her personal contact information to the potential seller via the Internet and if that seller contacts the buyer via phone and closes the sale, the dollar value of that sale would be part of Internet-assisted commerce. Internet-assisted commerce is a subset of commerce. It is not measured in the ICMM, but it is defined here for reference.
- **eCommerce:** eCommerce is the process by which an order is placed or accepted via the Internet (i.e., a buyer clicks an order button on the Internet), therefore representing a commitment for a transfer of funds in exchange for goods or services. eCommerce is a subset of Internet-assisted commerce. eCommerce does *not* include the following:
    - Non-Internet electronic commerce, such as orders placed by fax
    - Orders placed via email, even if the email system uses the Internet (This is because the commitment for a transfer of funds required by eCommerce does not happen via email today. Email typically represents an intent to commit, but a contract or purchase order [PO] must be sent and signed outside the email system for commitment. Email-commerce will count as

eCommerce if there is a digital signature that satisfies the commitment of a transfer of funds.)

- Electronic data interchange (EDI) transactions that do not use a Web-enabled gateway as a front end of the EDI system

- **Business-to-consumer eCommerce:** B2C eCommerce is the value of products/services purchased by individuals by clicking an order button on the Internet and intended for consumption by themselves, family, or friends. B2C eCommerce is a subset of eCommerce.
- **Business end-use eCommerce:** Business end-use eCommerce is the value of products/services purchased by businesses by clicking an order button on the Internet and intended for consumption by businesses (instead of being incorporated into their product/service offering)
- **Business supply chain eCommerce:** Business supply chain eCommerce is the value of products/services purchased by businesses by clicking an order button on the Internet and incorporated into the product/service offering (e.g., tires purchased and resold as part of a car by an auto manufacturer). Business supply chain eCommerce is a subset of B2B eCommerce.

Appendix II: Statistical Tables

2.1 Internet Economy

Table 2:– Value of the Internet Economy in the EU27, 2009-2010

Components of the EU27 Internet Economy, B€	2009	% of total	2010	% of total
BtoC eCommerce	272.667	63%	323.184	65%
Internet spending by consumers	47.363	11%	54.558	11%
Internet-related Investments - Private Sector	89.251	21%	96.384	19%
Internet-related Investments - Public sector	22.198	5%	24.184	5%
INTERNET ECONOMY	431.5	100%	498.309	100%
EU27 GDP	11,787		12,185	
% Internet economy on GDP	3.7%		4.1%	

Source: IDC 2011

Table 2 – Value of the Internet Economy by Component in France, Germany and UK (B€)

Components	France (2009)	France (2010)	UK (2009)	UK (2010)	Germany (2009)	Germany (2010)

CONSUMPTION						
BtoC eCommerce	50.6	60.4	61.8	73.5	71.89	83.92
Internet spending by consumers	8.3	9.508	6.88	8.47	9.09	10.20
INVESTMENTS						
Internet-related Investments - Private Sector	14.38	15.42	16.66	18.58	18.20	19.46
Internet-related Investments - Public sector	3.64	3.94	4.87	5.37	3.65	3.99
INTERNET ECONOMY	76.9	89.2	90.3	105.9	102.8	117.6
EU27 GDP	1,907	1,948	1565.7	1694.5	2,397.1	2498.8
% of Country GDP	4.0%	4.6%	5.8%	6.2%	4.3%	4.7%

Source: IDC 2011

Table 3. EU27 Internet users (000), 2009-2014

	2009	2010	2011	2012	2013	2014
France	40,751	42,177	43,614	45,063	46,523	47,995
Germany	58,856	61,286	63,713	65,317	66,919	68,519
Italy	27,844	30,315	32,196	34,087	35,987	37,896
Poland	19,584	21,105	22,627	24,528	26,049	27,569
Spain	25,362	27,469	30,084	32,270	34,496	36,760
UK	47,998	50,088	51,574	53,324	54,208	55,101
Rest of EU	80,383	86,443	91,043	94,918	98,062	101,217
Total EU 27	300,779	318,883	334,852	349,507	362,244	375,057

Source: IDC DMMF 2010

Table 4 EU27 Internet users (000) as a % of population, 2009-2014 (ranking)

	2009	2010	2011	2012	2013	2014
UK	77.8%	80.8%	82.8%	85.2%	86.2%	87.2%

Germany	71.6%	74.6%	77.6%	79.6%	81.6%	83.6%
France	65.4%	67.4%	69.4%	71.4%	73.4%	75.4%
Spain	54.9%	58.9%	63.9%	67.9%	71.9%	75.9%
Rest of EU	54.4%	58.4%	61.4%	63.9%	65.9%	67.9%
Poland	51.4%	55.4%	59.4%	64.4%	68.4%	72.4%
Italy	46.5%	50.5%	53.5%	56.5%	59.5%	62.5%
Total EU 27	60.4%	63.9%	66.9%	69.6%	71.9%	74.3%

Source: IDC DMMF 2010

Table 5 EU27 Internet Buyers (000), 2009-2014

	2009	**2010**	**2011**	**2012**	**2013**	**2014**
France	27,264	30,021	31,917	33,878	35,674	37,522
Germany	40,983	45,392	48,463	50,990	53,244	55,545
Italy	17,286	20,013	21,899	23,867	25,917	28,049
Poland	11,544	12,993	14,382	16,081	17,599	19,178
Spain	17,183	19,763	22,246	24,508	26,715	29,020
UK	31,271	34,272	36,836	39,152	40,886	42,661
Rest of EU	46,460	51,293	56,754	62,017	66,522	70,687
Total EU 27	91,993	213,747	232,497	250,492	266,557	282,663

Source: IDC DMMF 2010

Table 6 EU27 Internet Buyers (000) as a % of Internet Users, 2009-2014

	2009	**2010**	**2011**	**2012**	**2013**	**2014**
France	66.9%	71.2%	73.2%	75.2%	76.7%	78.2%
Germany	69.6%	74.1%	76.1%	78.1%	79.6%	81.1%

Italy	62.1%	66.0%	68.0%	70.0%	72.0%	74.0%
Poland	58.9%	61.6%	63.6%	65.6%	67.6%	69.6%
Spain	67.8%	71.9%	73.9%	75.9%	77.4%	78.9%
United Kingdom	65.2%	68.4%	71.4%	73.4%	75.4%	77.4%
Rest of EU	57.8%	59.3%	62.3%	65.3%	67.8%	69.8%
Total EU 27	63.8%	67.0%	69.4%	71.7%	73.6%	75.4%

Source: IDC DMMF 2010

Table 7 EU27 Internet Buyers (000) as a % of the population, 2009-2014

	2009	**2010**	**2011**	**2012**	**2013**	**2014**
France	43.8%	48.0%	50.8%	53.7%	56.3%	58.9%
Germany	49.9%	55.3%	59.0%	62.1%	64.9%	67.8%
Italy	28.9%	33.3%	36.4%	39.6%	42.9%	46.3%
Poland	30.3%	34.1%	37.8%	42.2%	46.2%	50.4%
Spain	37.2%	42.3%	47.2%	51.5%	55.6%	59.9%
UK	50.7%	55.3%	59.1%	62.6%	65.0%	67.5%
Rest of EU	31.5%	34.7%	38.3%	41.8%	44.7%	47.5%
Total EU 27	38.6%	42.8%	46.4%	49.9%	52.9%	56.0%

Source: IDC DMMF 2010

Table 8 EU27 BtoC eCommerce Revenues, €M and Growth Rate, 2009-2014

	2009	**2010**	**2010 Growth**	**2014**	**CAGR 2010-14**
France	50,590	60,358	19.3%	06,331	15.2%
Germany	71,892	83,921	16.7%	51,499	15.9%
Italy	32,727	39,616	21.0%	72,608	16.4%
Poland	1,147	1,363	18.9%	1,882	8.4%

Spain	11,296	13,567	20.1%	23,090	14.2%
UK	61,846	73,484	18.8%	24,206	14.0%
Rest of EU	43,168	50,875	17.9%	86,187	14.1%
Total EU 27	272,667	23,184	18.5%	565,803	15.0%

Source: IDC DMMF 2010

Table 9 EU27 BtoB eCommerce Revenues, €M and Growth Rate, 2009-2014

	2009	**2010**	**2010 Growth**	**2014**	**CAGR 2010-14**
France	229,290	279,265	21.8%	407,721	9.9%
Germany	488,520	593,528	21.5%	859,521	9.7%
Italy	179,513	207,891	15.8%	296,879	9.3%
Poland	6,925	8,517	23.0%	13,312	11.8%
Spain	98,948	115,820	17.1%	171,495	10.3%
UK	293,740	344,425	17.3%	522,216	11.0%
Rest of EU	277,491	324,873	17.1%	474,620	9.9%
Total EU 27	1,574,426	1,874,319	19.0%	,745,764	10.0%

Source: IDC DMMF 2010

2.2Internet Industry

Table 10 EU27 Total Internet Industry Estimates and Forecast by macro-area, EU 27, €Million and % growth rates

€Million	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Internet-related IT and Networks	48,657	56,025	60,795	65,441	70,464	77,131
Internet-related Telecommunications services	73,295	80,360	86,222	91,860	97,256	102,073

Grand Total	121,952	136,386	147,017	157,300	167, 720	179,204
% growth rates						
Internet-related IT and Networks		15.1%	8.5%	7.6%	7.7%	9.5%
Internet-related Telecommunications services		9.6%	7.3%	6.5%	5.9%	5.0%
Grand Total		11.8%	7.8%	7.0%	6.6%	6.8%

Source: IDC 2010

Table 11 EU27 Internet Industry Revenues by Country, 2009-2014

€Million	2009	2010	2011	2012	2013	2014
France	20,621	23,015	24,945	26,395	27,785	29,239
Germany	23,415	25,829	27,963	29,991	32,354	34,794
Italy	13,619	14,916	16,047	17,160	18,335	19,546
Poland	3,055	3,346	3,692	4,021	4,339	4,605
Spain	9,672	10,914	11,709	12,558	13,507	14,493
UK	20,610	23,842	25,254	27,051	28,756	31,097
Rest Of EU 27	30,960	34,523	37,407	40,125	42,645	45,430
Total EU 27	**121,952**	**136,386**	**147,017**	**157,300**	**167,720**	**179,204**
% growth rates						
France		11.6%	8.4%	5.8%	5.3%	5.2%
Germany		10.3%	8.3%	7.3%	7.9%	7.5%
Italy		9.5%	7.6%	6.9%	6.8%	6.6%
Poland		9.5%	10.3%	8.9%	7.9%	6.1%
Spain		12.8%	7.3%	7.3%	7.6%	7.3%
UK		15.7%	5.9%	7.1%	6.3%	8.1%
Rest Of EU 27		11.5%	8.4%	7.3%	6.3%	6.5%
Total EU 27		11.8%	7.8%	7.0%	6.6%	6.8%

Source: IDC 2010

2.3ICT in the World

Table 12 Total ICT, International comparison, 2009, 2010, 2014 €M, % breakdown and growth, EU27 and US

		2009 Value	2009 Breakdown	2010 Value	2014 Value	CAGR 2010-2014	2014 Breakdown
EU	***IT and Networks***	***295,424***	***54.9%***	***303,569***	***350,018***	***3.6%***	***60.2%***
	Hardware and Networks	91,964	17.1%	98,497	110,008	2.8%	18.9%
	Packaged software	59,590	11.1%	61,047	74,520	5.1%	12.8%
	IT services	143,871	26.7%	144,025	165,490	3.5%	28.4%
	Telecommunications services	***242,812***	***45.1%***	***240,583***	***231,832***	***-0.9%***	***39.8%***
	Voice services	159,929	29.7%	154,501	139,794	-2.5%	24.0%
	Data services	82,882	15.4%	86,082	92,038	1.7%	15.8%
	Total ICT	**538,236**	**100.0%**	**544,152**	**581,850**	**1.7%**	**100.0%**
US	***IT and Networks***	***362,868***	***60.4%***	***379,714***	***467,836***	***5.4%***	***66.0%***
	Hardware and Networks	112,722	18.8%	123,198	159,881	6.7%	22.5%
	Packaged software	99,167	16.5%	103,261	131,425	6.2%	18.5%
	IT services	150,979	25.1%	153,255	176,530	3.6%	24.9%
	Telecommunications services	***237,774***	***39.6%***	***239,940***	***241,258***	***0.1%***	***34.0%***
	Voice services	163,492	27.2%	159,778	141,994	-2.9%	20.0%
	Data services	74,281	12.4%	80,163	99,264	5.5%	14.0%
	Total ICT	**600,642**	**100.0%**	**619,654**	**709,094**	**3.4%**	**100.0%**

Source: IDC 2010

Table 13 Total ICT, International comparison, 2009, 2010, 2014 €M, % breakdown and growth, Japan, China and India

		2009 Value	2009 Breakdown	2010 Value	2014 Value	CAGR 2010-2014	2014 Breakdown
Japan	***IT and Networks***	***94,394***	***52.4%***	***94,895***	***95,731***	***0.2%***	***53.8%***
	Hardware and Networks	38,960	21.6%	39,863	34,914	-3.3%	19.6%
	Packaged software	16,861	9.4%	16,958	18,766	2.6%	10.5%
	IT services	38,572	21.4%	38,074	42,052	2.5%	23.6%
	Telecommunications services	***85,792***	***47.6%***	***83,354***	***82,148***	***-0.4%***	***46.2%***
	Voice services	47,854	26.6%	44,018	37,745	-3.8%	21.2%
	Data services	37,938	21.1%	39,336	44,402	3.1%	25.0%
	Total ICT	**180,185**	**100.0%**	**178,249**	**177,879**	**-0.1%**	**100.0%**
China	***IT and Networks***	***55,693***	***38.0%***	***67,430***	***105,858***	***11.9%***	***46.3%***
	Hardware and Networks	44,165	30.2%	54,607	84,339	11.5%	36.9%
	Packaged software	3,855	2.6%	4,172	6,694	12.5%	2.9%
	IT services	7,673	5.2%	8,651	14,825	14.4%	6.5%
	Telecommunications services	***90,752***	***62.0%***	***94,748***	***122,669***	***6.7%***	***53.7%***
	Voice services	63,553	43.4%	61,811	58,475	-1.4%	25.6%
	Data services	27,198	18.6%	32,938	64,194	18.2%	28.1%
	Total ICT	**146,445**	**1**	**162,178**	**228,526**	**9.0%**	**100.0%**
India	***IT and Networks***	***14,587***	***44.3%***	***16,430***	***29,787***	***16.0%***	***47.4%***
	Hardware and Networks	8,569	26.0%	9,485	16,370	14.6%	26.1%
	Packaged software	1,910	5.8%	2,191	4,247	18.0%	6.8%
	IT services	4,108	12.5%	4,754	9,170	17.8%	14.6%
	Telecommunications services	***18,364***	***55.7%***	***21,933***	***33,012***	***10.8%***	***52.6%***
	Voice services	15,015	45.6%	17,890	25,265	9.0%	40.2%
	Data services	3,349	10.2%	4,042	7,747	17.7%	12.3%
	Total ICT	**32,952**	**1**	**38,363**	**62,799**	**13.1%**	**100.0%**

Source: IDC 2010

Table 14 Total ICT, International comparison, 2009, 2010, 2014 €M, % breakdown and growth, Rest of the World (RoW)

		2009 Value	2009 Breakdown	2010 Value	2014 Value	CAGR 2010-2014	2014 Breakdown
RoW	***IT and Networks***	***199,649***	***38.0%***	***219,539***	***300,077***	***8.1%***	***42.9%***
	Hardware and Networks	108,500	20.7%	123,418	169,101	8.2%	24.2%
	Packaged software	29,768	5.7%	31,548	44,978	9.3%	6.4%
	IT services	61,381	11.7%	64,573	85,997	7.4%	12.3%
	Telecommunications services	***325,633***	***62.0%***	***344,796***	***399,611***	***3.8%***	***57.1%***
	Voice services	239,772	45.6%	247,850	266,113	1.8%	38.0%
	Data services	85,861	16.3%	96,946	133,498	8.3%	19.1%
	Total ICT	**525,282**	**100.0%**	**564,335**	**699,689**	**5.5%**	**100.0%**

Source: IDC 2010

Appendix III: Main Technology Trends

3.1 Internet and the Cloud

3.1.1 Innovation in ICT delivery models over the Internet

The widespread diffusion of the Internet and IP-based networks, as the new common infrastructure for all business users, represents the trigger for a much-discussed trend: the emergence of new business models for the distribution and delivery of IT software and services, which become externalized and commoditized. This includes also the transformation of some of the basic IT applications into services (for example basic office applications). The spread of cloud-delivered services such as SaaS (software as a service) is comparable, in terms of potential disruption to the value chain, to the appearance and general uptake of IT outsourcing services around 20 years ago. In the next 5 years, cloud computing is expected to have a considerable impact on the business and consumer markets. There is a lot of hype about cloud technologies and services in the industry and offerings are not yet as mature as the attention would indicate, as noted for example by the Berkeley university (*Above the Clouds: A Berkeley View of Cloud Computing, February 2009*) and McKinsey ("*Clearing the Clouds*", draft paper, 2009). However, there is no doubt that this evolution is happening and that adoption is accelerating, with a potential transformative impact on the value chain of IT services. Global competitors such as Google and Amazon are exploiting this trend to challenge in their field giants such as Microsoft, SAP and Oracle, not to mention the new competitors who might emerge. However, in reality, at this point the main activities in the enterprise segment of the market are focused on evaluating and deploying cloud technologies in a "private" environment, as pushed strongly by many of the large established technology and service providers (such as IBM and HP), rather than the public cloud. Although the private cloud segment is not part of the Internet market (see below), for many organizations creating private cloud environments is an initial step towards embracing more public cloud services in the future.

The diffusion of cloud technologies and delivery models is driven by the promise of considerable advantages to business users, including greater flexibility, lower capital investments, and lower management costs. For the IT industry the main driver is the ability to increase the range of application and services in their offering, drive economy of scale through their delivery models (and hence potentially protect and grow margins), and widen their market to new user categories. For example, there is consensus that this trend opens new opportunities for small and medium enterprises (SMEs), who will be better able to exploit ICTs for their business strategies.

The main barriers slowing this trend concern the complexity of the transformation and the considerable organizational, but also technological innovation needed (to transform existing ICT environments, to update business processes, to improve standardization, interfaces and interoperability, to adapt and update security and accounting processes).

In Europe, uptake of public cloud-based services is somewhat behind that in the US, and consequently the suppliers are smaller in size, and also likely to be displaced by US-based competitors in the mass market, though there is always room for innovative players in niche areas. However, there is a growing number of EU-based IT services providers that are offering strong "private cloud" services, and who are in a good position to compete with US vendors. However, the main impact on the EU is within the IT customers who

have the potential to realize lower costs and greater flexibility of IT systems – though both these depend on customers applying some discipline to the purchasing processes.

IDC uses the umbrella term "cloud services" for a diverse set of consumer and business products, services, and solutions delivered and consumed in real time over the Internet. According to IDC's definitions, public cloud services must satisfy all the following attributes:

- Shared or standard service: built for a market (public), not a single customer
- Solution-packaged: a complete turnkey offering, integrating all the required resources needed for the service to work
- Self-service: tasks such as administration and user provisioning are performed by the customer, though the customer may require (and receive from the vendor) some "on-boarding" support
- Elastic scaling: dynamic and fine-grained scaling enables the customer to consume as much or as little of the service as they require; many services enable the customer to flex usage in near real time
- Use-based pricing: supported by service metering so the customer pays for what they consume
- Accessible via the Internet/IP: the service is available via ubiquitous (authorized) network access
- Standard UI technologies: customers can access the service via browsers, RIA (rich Internet architecture) clients, and underlying technologies
- Published service interface/API: customers can carry out machine-to-machine interaction via a standard interface technique, typically Web services APIs

These characteristics are fully applicable for "public" cloud services (for example, services like saleforce.com, Amazon Web Services or Microsoft Azure) that are available to anyone with the means to pay. There is a growing range of hosted "private cloud" services that do not adhere to the first characteristic, but which do conform to all or nearly all the other characteristics. Some large organizations are attempting to build internal private cloud services to serve their own users more effectively.

The public cloud services fall into six different areas:

- Cloud application services (also often called "software as a service" or SaaS), services that substitute for on-premise applications like CRM, e-mail, collaboration or talent management
- Cloud platforms, services that provide facilities needed to develop and deploy applications to the cloud
- Cloud infrastructure, services to monitor, manage and defend cloud and on-premise systems, including cloud storage management, security software and systems management software

- Cloud servers, services that provide a (typically virtualized) server that customers load their own systems software and applications onto (many cloud server providers offer the ability to rent operating systems and database software to deploy onto cloud servers)
- Cloud storage, services that provide storage capabilities in the cloud.
- Cloud business services, services that provide business or transactional services in the cloud, such as payment processing and supply chain services.

These definitions are IDC's, but many other research organizations have adopted very similar categories.

Both the demand side and the supply side for cloud services are growing rapidly, but from a small base. On the demand side, an IDC survey in January 2010 found that the majority of organizations with more than 50 people in France, Germany, Italy, the UK, Benelux and the Nordics, were already using public cloud services in at least one usage area[i], and almost half in two or more areas. Furthermore, organizations were evaluating cloud services for a number of different usage areas. IDC believes that cloud services have reached widespread acceptance, and European organizations of all sizes and industries are open to using them, to gain cost and flexibility benefits.

On the supply side of the cloud services market, vendor coverage is patchy. In some sectors of the market there are "pure play" cloud services vendors who have established strong market positions (for example, salesforce.com and Rightnow in CRM, SuccessFactors and Taleo in talent management, Amazon.com in cloud servers and cloud storage), but for many parts of the market there is no clear leader and indeed no obvious candidates for market leadership. In particular there is no obvious cloud services leader for enterprise resource management or financial management.

Amongst vendors of on-premise software products, there is a lot of variation in their cloud-readiness. Some are vigorously launching cloud services that substitute for their existing products, or extend their products into new areas. Others are just hoping that the cloud phenomenon will pass and doing nothing. But most are somewhere in-between, launching some new cloud-based products while expecting their traditional business to carry on as normal for some time to come. This is where most EU-based software vendors find themselves, including the largest EU-based software vendor, SAP.

As a result, in Europe, uptake of cloud-based services is currently somewhat behind that in the US, and consequently the suppliers are smaller in size, and also likely to be displaced by US-based competitors in the mass market, though there is always room for innovative players in niche areas.

One area that looks potentially strong in the EU is that of hosted private cloud services. These offer most but not all of the cost advantage of a public cloud service but with some additional features that make the more attractive to cautious customers. For example, private cloud services can offer features such as designated main and back-up locations for a customer's workload and data, dedicated hardware and/or system image, and private network connection between the customer and the data centre. These are features that would be difficult for public cloud vendors to offer, because they increase cost, remove

operational flexibility and decrease system standardization and utilization, so breaking their business model.

Also, there is a growing number of EU-based IT services providers that are offering strong "private cloud" services, and who are in a good position to compete with US vendors. However, the main impact on the EU is within the IT customers who have the potential to realize lower costs and greater flexibility of IT systems – though both these depend on customers applying some discipline to the purchasing processes.

3.1.2 How Will Cloud Adoption Influence the Internet Market?

Cloud services can either be public – designed for a market, not a single customer as described above – or private, restricted to a single user organization. Private cloud can be installed in a customer data centre or offered as a hosted service from a service provider, in which case it resembles any other hosted service though with the specific cloud features such as automated provisioning and the ability to rapidly scale up and down. Private cloud solutions are not part of the internet market, nor are the related services; however a hosted implementation of private cloud solutions will be part of the internet market.

Thus the development in cloud adoption will be vital to the development of the internet market. Private cloud is both a barrier and a driver for public cloud: a driver in the sense that it develops familiarity with the solution, particularly hosted private cloud has that role, but also a barrier because large enterprises have "sufficient" flexibility and cost saving to want to move to public cloud.

Cloud services are already quite popular across Europe with penetration rates at 2% in 2009 growing to 9% of the software market in 5 years, a CAGR of 39% over the period 2009-2014. Typical applications used will be email, collaborative applications such as for instance Microsoft's BPOS and collaborative tools. But also business applications such as CRM – with salesforce.com as the most prominent example – F&A and HR applications are increasingly purchased in a SaaS delivery model, despite worries about security in some IT-departments.

There is growing interest in cloud infrastructure services, and there is already widespread adoption in certain cloud security services, such as filtering e-mail for spam and/or malware in attachments. We also see a growing interest in other cloud infrastructure services, such as cloud servers which enable IT departments to run large scale tests of new software without the cost of buying physical servers.

There are already launches of services that enable enterprises to use public cloud infrastructure capacity as spill-over from private solution for almost any application with radical burst in capacity consumptions such as annual billing, response to marketing campaigns etc. and this will drive public cloud adoption when familiarity and trust is developed. The combined marketing muscles of HP and IBM and others are now fully behind pushing cloud infrastructure services in the market with many announcements of offerings and partner programs around cloud infrastructure service during 2010 and 2011.Some of these services are offered as private cloud while others are hybrids of private and public services.

Growth in public cloud will spur radical changes in the surrounding IT:

On the services side we will see growth in integration with other non-cloud applications and support for strategies and migration. On the software and hardware side we will see a slow migration to "cloud-aware" appliances and solutions that integrate better with cloud solutions in other parts of the environment and perhaps adopt some of the characteristics, and a skewing towards environments based on more external traffic. Also "cloud accessory" product such as back up, file/data management and security will grow aiming at leveraging effectively public cloud services in conjunction with internal systems. This means that the "cloud thinking" gradually takes over enterprise IT facilitating a gradual slow migration to public cloud.

Growth in public cloud and private cloud makes service providers an increasingly important customer group for vendors of hardware and software: Capacity at all levels will be owned by service providers deploying solutions at large scale, thereby consolidating the buyer side for IT. Thus services providers - whether pure services companies or software or hardware vendors with service capabilities - will become large enterprises customers for the IT industry and professional purchasers as that, and will gain influence on the IT market both in terms of prices and functionality requirements.

Availability of cloud infrastructure combined with high bandwidth access for residential users is starting to drive growth in applications that are directed at consumers. We expect to see a whole new range of areas developing such as in health and education – and also in entertainment.

3.1.3 Governance and security issues in the Cloud

Security, governance and location of corporate data are the top concerns that CIOs have when considering using services supplied over the internet (or cloud services, in IDC's taxonomy). These concerns may represent a barrier and slow down the diffusion of cloud services, unless addressed. There are two strands to overcoming these concerns. Firstly, existing and new vendors will need to address customers' specific governance and security issues as far as possible. Secondly, as customers gain greater familiarity and trust in cloud services in general and their specific vendors in particular, their concerns will reduce. In the long run there will be greater emphasis on trusted services and less on data location, security and governance.

In terms of security, the CIO must be able to show that the IT organization is taking suitable precautions to avoid security breaches such as unauthorized access and data loss or theft. CIOs therefore need to ensure that any external provider matches or exceeds the IT organization's minimum security requirements, taking into account the type of data involved and the processes being carried out, and including the security of data interchange between the in-house systems and the supplier's systems. So, for example, the security level demanded for transmission, processing and storage of live data would be far higher than for dummy test data used during system trials.

Nearly all large organizations have had IT security lapses, for example inadvertently making data available on the internet or falling victim to a hacking attack. However, many lapses do not involve the internet at all. A fairly common lapse amongst banks is the dumping of un-shredded print-outs of detailed customer account information. In

government, employees have left memory sticks or even laptops with sensitive data in trains or restaurants, or even sent computers with sensitive data still on the hard drives to recyclers.

By comparison, cloud services providers are forced to adhere to very high standards, because they cannot do business without them. Even the smallest cloud services vendors are seen as a "honey-pot" for personal and business data, and they come under intense attack from "cyber criminals", which they quickly learn how to deal with or they do not survive. Due to this trial by fire, cloud services vendors are significantly more secure than the vast majority of the customers they serve.

In terms of governance, a key element affected by adopting cloud services is the ability to demonstrate that business processes have been correctly carried out. In theory, with an on-premise system, the CIO can demonstrate from the software code that the correct business processes have been followed. In practice, applications software is so complex that checking for compliance by inspecting application code (or formal verification) is an impossible task. However, CIOs still need to demonstrate that the processes accomplish their required results, and they can do this by testing. Testing is just as applicable to internet services in the cloud as it is to on-premise software.

In terms of data location, the CIO's concern is that their data enjoys less protection in the country where their vendor's servers are located than in the CIO's base country. This might lead to data being released, for example through legal action, in the vendor's country that would not be released in customer's home country. There is a particular concern about the US PATRIOT act, which in theory allows the US government to access any data stored in the US. While there is some danger here, it is often overestimated.

In addition, the EU Data Protection Directive places restrictions on the transfer of sensitive personal information outside the EU. This covers data revealing racial or ethnic origin, political opinions, religious or philosophical beliefs. or trade union membership, data concerning health or sex life, and data relating to offences, criminal convictions or security measures. The country where this data is located must meet the EU's requirements for an adequate level of protection. The list of countries that meet this test is relatively short but it includes the US, Canada and Switzerland. For storage in the US, the vendor must have a Safe Harbor agreement in place. Data Commissioners in different countries in the EU can authorize data transfer to additional countries.

Looking at the situation from the vendors' point of view, ideally they need to have a relatively free hand over data location. For example, they can use servers in data centres on the other side of the world during their quiet hours for backup, recovery and fail-over to servers in the customer's region. This reduces their costs, enabling them to offer customers a favourable price, and also reduces carbon emissions.

In summary, while there are issues that need to be taken into account by both vendors and customers, these will be insuperable barriers in rare cases only. The more known and quantified, the less will the challenges and risks become.

3.1.4 Internet or Cloud-based Ecosystems

IDC expects a new type of internet-based ecosystems to emerge over the next five years. Cloud-based applications have a much simplified and more transparent way of integration and that is the reason why we expect the internet-based ecosystems will be different than traditional ISV ecosystems. Because internet applications have such high degree of standardization, ISVs can embed each other's applications as opposed to reinvent the wheel. As a consequence, IDC expects the emergence of Pandora's box-type embedding of commercial applications, also referred to as product compounding.

One interesting angle of these internet-based ecosystems is that cloud applications have such transparent interfaces that the typical certification, contractual arrangements, and vendor consent are often not needed in cloud-based ecosystems. Cloud vendors simply embed links to other third-party cloud applications without asking for permission. This is a not a copyright or licensing problem because the end-user cannot use an embedded application without buying access rights to it. So cloud application vendors typically accept and condone this type of informal integration from other providers because it extends their reach to new customers without any paperwork, fees, or marketing involved.

Another important angle is the speed of growth as well as the frequency of change in internet-based ecosystems when compared to traditional on-premise ecosystems. Traditional packaged integration between two different software products typically involves one product achieving certification status for the other product. This certification involves R&D staff from both vendors as well as equipment on which to do sandboxing, testing, and final certification. These resource requirements set a natural limit to how fast a traditional vendor ecosystem can grow. However, because internet-based solutions have such transparent integration points, less formal collaboration and time consumption is needed and no dedicated hardware is required. Internet-based ecosystems can therefore grow the number of participants faster than traditional ecosystems. For the same reasons, IDC also expects internet-based ecosystems to be far more loosely coupled, more global in nature, more dynamic, and more occasional than traditional, stable on-premise ecosystems.

Finally, cloud-based ecosystems are, due to higher transparency and simplicity of integration, expected to become more complex than traditional ecosystems. Traditional ecosystems can typically be characterized as one-to-many, e.g. many different niche applications certified for the SAP Business Suite 7 platform. A cloud-based ecosystem could involve multiple application tiers, some of which will be hubs, e.g. salesforce.com or Webex, others will be niche applications and yet others will be content services. Such a scenario is likely to involve multiple, bidirectional integrations, e.g. a salesforce.com plug-in for Webex and a Webex plug-in for salesforce.com. The most informal types of application compounding will be akin to the so-called mash-up, which implies an easy, fast integration, frequently using open APIs and data sources to produce enriched web pages.

Cloud-based ecosystems open an opportunity for European ISVs, because they can bring their valuable domain knowledge in areas such as public sector, legislation, industries, specific cultural variations etc. to market in the shape of add-on subscription services. Some European ISVs will be able to abandon commoditized software areas where the competition is high and price points low and instead focus on niche areas of true

specialization. The barrier of entry is significantly lower in internet-based ecosystems compared to traditional ecosystems.

In certain horizontal software areas, such as infrastructure software, European ISVs is likely to experience increased competition due to the global nature of internet-based ecosystems, and hence global competition.

Some European ISVs with significant internet presence will act as hubs and strengthen their market position as ecosystem coordinators. Among future European ecosystem orchestrators, IDC expects to find large ISVs such as SAP, Software AG, and Sage as they build out cloud platforms, as well as smaller internet natives, such as Twinfield, StepStone Solutions, e-conomic, etc.

3.1.5 The shifts in the value chain: evolution of the software licensing models

IDC expects a continued shift towards recurring, subscription-type licensing as internet-based solutions get further adopted. IDC believes the most popular subscription model will be monthly fees; however, vendors are likely to promote annual or multi-year contracts in order to improve the predictability of future revenue streams.

Furthermore, IDC expects several licensing models to emerge as dominant as opposed to seeing one specific licensing model to prevail. The most popular licensing types for cloud solutions are likely to be:

1. Recurring periodic payment per user
2. Recurring periodic payment per employee (i.e. enterprise license)
3. Recurring periodic payment per transaction
4. Perpetual license payment per user and/or per "engine" with an optional annual maintenance fee (the traditional model).

IDC believes that solution buyers will regard certain solutions as strategic or critical and some buyers will prefer to acquire such solutions as capital investments. While the proportion of perpetual license-based spend will fall over the next five years, a certain segment of the market will keep their preference for capital expenditure with subsequent depreciation (license) over operational expenses (subscription).

Why is this important in this context? The answer is quite simple. This change from perpetual licenses to recurring revenues will profoundly impact the software industry. One impact is that solution revenues will be more stable at the vendor level. A subscription revenue stream cannot grow as steeply as perpetual license-based software vendors have done in the past. On the positive side, subscription revenues are much more resistant to downturns than perpetual license revenues. Since most solution vendors have a revenue-based headcount model, the higher degree of revenue stability in subscriptions implies a higher stability from a software industry employment perspective.

Furthermore, recurring licensing implies a shift of power from the vendor to the customer, compared to perpetual licenses. If a customer buys a perpetual license from a vendor, his/her bargaining power declines dramatically as soon as the purchase has occurred. If the customer has a bad experience with the software, he/she has few or no exit options, except

to abandon the entire investment in licenses, services, hardware, and internal time and move on to acquire an alternative solution. Vendors of subscription-based solutions have much more at stake, because the unsatisfied customer can cancel the monthly or annual renewal, which makes up a significant portion of the total lifetime customer value. Because of this shift of power, IDC expects cloud-based vendors to invest significantly more resources into ensuring customer success and that customer satisfaction will become the number one key performance indicator. Such an approach and business model will, in turn, ensure a more prosperous cloud provider industry in the long term.

Finally, a shift to recurring revenues will require vendors to rethink how they compensate field sales and channel partners. Perpetual license fees could easily have a proportion allocated to sales compensation. However, if that same percentage is applied to a similar subscription-based cloud solution, the sales compensation will be dramatically lower compared to traditional software because such a limited proportion of the revenue is collected upfront. Therefore, cloud solution vendors must come up with a new method for sales compensation. IDC expects compensation based on an estimated total lifetime value or a relatively high proportion of the total initial contract value to become the most popular sales compensation models.

In terms of the earnings potential for European cloud solution providers of subscription-based offerings, IDC believes that a future, cloud-based software industry has strong profit potential. While the recurring subscription profits might never reach the margin levels that leading perpetual license vendors have enjoyed, a cloud-based software industry remains a scale-based industry with strong profit potential. Subscription-based cloud offerings are normally delivered on a basis of multi-tenancy, which means that customers share resources at the data, application, and presentation level. This one-to-many style of cloud software delivery implies significant economies of scale potential and hence the expectation of solid future margins.

3.2 Enterprise 2.0 applications and services

The term Enterprise 2.0 (from now on E20) was coined to describe the adoption of the web 2.0 tools and culture into the enterprise. It is a growing and promising field, of strategic economic importance for both the European software industry and for the productivity of European companies, especially SMEs. E2.0 is the business equivalent of web 2.0, a trend which may mirror the rapid diffusion of social networking applications and services in the business world. E2.0 is a set of tools to promote knowledge management, unlock innovation potential, and generate new efficiencies, and may contribute significantly to the growth and competitiveness of the European knowledge economy.

The definition may include a system of web-based technologies that provide rapid and agile collaboration, information sharing, and emergence and integration capabilities in the extended enterprise. Core functionalities of E2.0 may include tools such as: hypertext and unstructured search tools; wikis; weblogs for storytelling; social bookmarking for tagging and building organizational folksonomies; RSS for signalling; collaborative planning software for peer-based project planning and management; ideas banks for ideation (idea generation); social networking tools; mash-ups for visualization etc.

Finally, E2.0 also has a strong cultural dimension, in terms of management. It refers to a less hierarchical, post-Fordist management style, where information sharing is actively cultivated outside hierarchical boundaries, and knowledge is shared through flows rather than in structured format, mainly by promoting peer-to-peer contact between individuals. It is also largely a generational trend, with younger workers often pushing for the introduction of such tools in the companies.

On the other hand, Enterprise 2.0 is vaguely defined and is at permanent risk of oscillating between a narrow, dry technological perspective and a normative and wishful emphasis on collaboration and openness. Data on take-up and market share are contradictory and do not provide a robust perspective on the size and importance.

Enterprise 2.0 combines set of new software collaboration tools and working practices. A large share of the market is supplied via cloud-based services. E2.0 gives knowledge workers of all kinds new and more effective ways to work together within and between organizations, across distance and time-zones. This market is small but growing very rapidly – as is the associated consulting and change management services. It is going to be very important to the continued success of European organizations that they embrace E2.0 effectively. The US market is ahead of the EU at the moment, and we expect this to continue. As a result the largest players in this market are US-based, though there are some innovation EU-based players.

The term Enterprise 2.0 was coined by Professor Andrew McAfee of MIT's Centre for Digital Business, and further explained in his book "Enterprise 2.0: New Collaborative Tools for your Organization's Toughest Challenges". From McAfee's and other's work in this area, IDC developed a working definition that could be used to identify E 2.0 tools and differentiate them from other collaboration tools that have been in use for many years. The working definition is that an E 2.0 product is one or more of the following:

- A tool for identifying people with expertise, knowledge or interest in a particular area and linking to them
- A tool for finding, labelling and sharing useful content/information (authoring)
- A tool that offers capabilities such as a Wiki for collaboration including collective authoring and project work
- A full suite of offerings including the above with cross-links and a shared knowledge-base.

IDC believes that these tools will play an important role in transforming organizational performance in this decade. Many organizations are extremely stove-piped which means knowledge and expertise are not reused effectively - while re-using both these assets is critical to organizational success in the highly competitive world we now occupy. Even in organizations that have a more open structure, there is often ineffectual sharing of knowledge and expertise due to the size, physical spread, multiple roles and lines of business, and different time zones occupied by organization. Appropriate use of E2.0 tools can reduce these barriers to effective collaboration. This view is shared by many consulting organizations that see E2.0 tools as a good technology to support organizational transformation projects in large organizations. E2.0 tools also have potential benefits in

mid-sized and geographically dispersed organizations where conventional tools cannot fully enable collaborations amongst knowledge workers.

The market for E2.0 tools is small but growing strongly in the EU. IDC forecasts that spending on E2.0 tools in the EU will rise from €97m in 2009 to €559m in 2015. Using IDC's market data on the number of e-mail boxes in the EU as a surrogate for knowledge worker numbers, IDC forecasts that penetration of E2.0 tools amongst knowledge workers will reach 1.6% in 2014[ii], up from 0.1% in 2009. However, this still leaves the EU some way behind the US in terms of market size (€205 in 1999 growing to €1302 in 2015).

EU players in E2.0 include Bluekiwi (France), Coremedia (Germany) and Huddle (UK). However, because of the US organizations' openness to rapidly embrace new technologies, all the largest players are US -based – although this includes some émigrés like Socialtext (whose founders come from Estonia) and Atlassian (originally based in Australia, but which has its largest customer base in the US).

A high proportion of these tools are delivered as services from the internet (or software-as-a-service) and IDC expects this delivery mechanism to increase significantly as the market grows. Some existing providers like IBM have begun offering a choice of delivery models, including a service over the internet as switched, while many others deliver only as a service over the internet, including some suppliers that originally offered their product as conventional licensed software that customers had to install and run themselves.

Delivery over the internet has certain advantages for customers. They can have the tools up and running very quickly, they do not have any capital outlay, and they can expand or even contract the number of users flexibly, subject to contractual agreements (for example, they may have negotiated a favourable price for a specified number of users). Users can typically access these services from wherever they are over a range of different devices. Also, a key facilitator for many organizations is the in-built ability to collaborate between different countries, different time zones and potentially different organizations that do not share a common infrastructure.

A potential barrier to E2.0 adoption in the EU is that these tools generate much greater visibility of employee's individual contributions. A user's activity within the tool is visible to all other authorized users - this is an explicit way that the tools facilitate greater collaboration. However, this visibility brings employee privacy concerns in certain countries. These concerns could be brought to a head if activities on E2.0 were used for employee evaluation, appraisal or reward. However, this seems inevitable as E2.0 becomes a facilitator for crucial organizational work.

3.3 Next-generation access technologies

There are four principal network access methods to provide "next generation" access: VDSL, Point-to-point Ethernet (EP2P), PON and DOCSIS 3.0 cable. Theoretically, VDSL can offer up to 200Mbps using loop bonding (bundling of two or more lines in a single connection). However, the lack of spare existing lines deployed in Western Europe means that this is not a realistic commercial service level.

The business case is a critical element in the deployment of next-generation access. Operators need to evaluate alternative elements to create a business case that justifies the substantial investment levels that are required. The choices that operators make are very dependent on their specific situation in terms of regulatory regime, competitive environment, network architecture, and existing business.

Many early next-generation access service portfolios have been characterized by a premium price level compared with services based on first-generation broadband. This strategy is deployed especially by incumbent operators that deploy next-generation access services alongside the existing ADSL services. In many cases, this has meant that the take-up of services has so far remained modest compared with ADSL. Over time it will become even more difficult to maintain a substantial price premium in many countries, as cable operators and alternative players increase the bandwidth to their end users for price levels comparable to current mainstream prices, and end users will demand nothing less from the incumbent operator. As a consequence next-generation access services will move mainstream.

Almost every business case for next-generation access includes a component of up-selling services. The higher capacity allows providers to offer and develop new services (e.g., HDTV, video calling) and, equally important, it allows the consumer to use them at the same time. The broader portfolio should allow operators to increase the average revenue per customer, or, in some cases, at least stop the negative trend.

Operators with a legacy network can fund part of the next-generation access network build-out by the proceeds from the sale of real estate that is no longer necessary in the new architecture, such as many central office buildings. This will only be possible if the next-generation access network directly replaces the existing infrastructure. So far, most operators have been deploying next-generation access networks as an overlay to the legacy infrastructure. In the longer term, however, the transition to next generation access is likely to involve a level of replacement of legacy, CO-based infrastructure. The proceeds from the sale of real estate that may become redundant in this process can help fund the next-generation access network. In such a scenario, an incumbent operator has to negotiate with the regulator and alternative DSL operators the terms under which the central offices can be closed, as these alternative operators have their DSLAMs located in exactly those sites.

Operators that have both fixed and mobile operations should take a more converged view on their next-generation access plans. Instead of building a business case for fixed access services to end users only, they can include the backhaul of their mobile base stations in the same planning cycle. With the acceleration of mobile broadband, uptake in demand for mobile backhaul capacity will grow substantially over the coming years. Designing and planning in a holistic manner will result in a more favourable business case for next-generation access.

3.4 Next-generation mobile connected devices

For most of their history, mobile networks had only one type of device connected to them: mobile phones. But from the mid-2000s, phones were joined on mobile networks by personal computers (PCs), as 3G/HSPA networks delivered the data speeds that

connectivity for such devices requires. And now, we are starting to see a variety of new types of device acquire mobile network connectivity. This "next generation" of mobile connected devices includes existing consumer electronics products with an added component of cellular connectivity, such as satnav devices and video players; and also new classes of device, such as smart books and media tablets. It is an increasingly diverse group of devices, united by their use of ubiquitous connectivity as a core part of their value proposition. As such, they present both opportunities and threats for players in the mobile internet value chain, including mobile operators, device manufacturers and content owners.

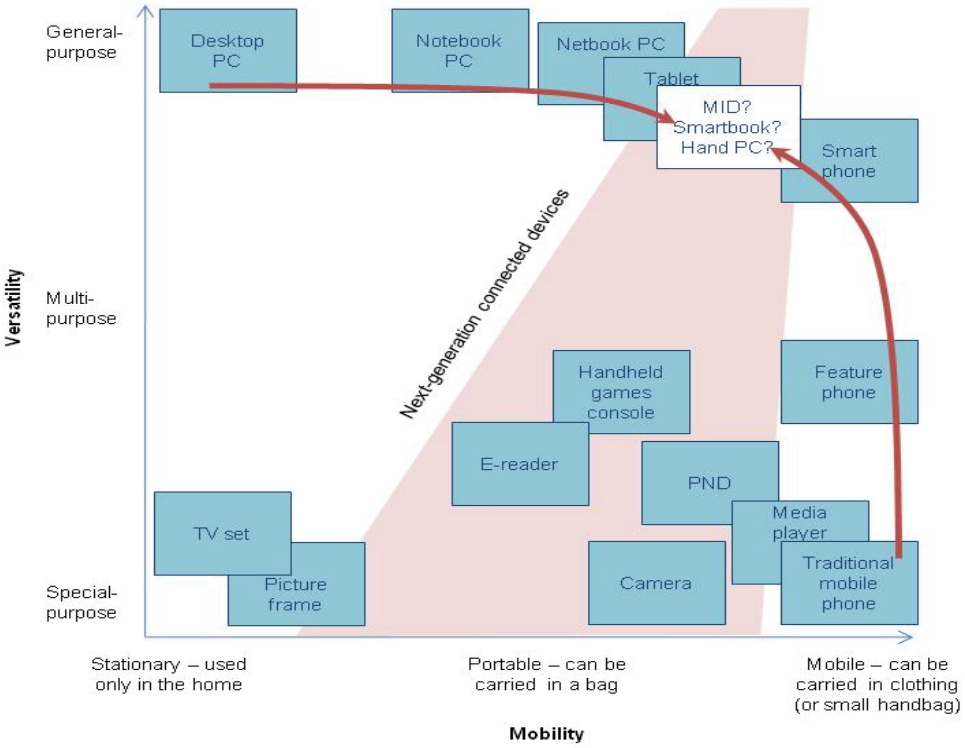
- For mobile operators, they represent a new retail opportunity, a way to sell more data plans and potentially new wholesale opportunities. But they may also put undue strain on the networks and relegate operators to the role of invisible access providers.
- For manufacturers, they represent an opportunity to diversify and expand the top end of their market. But in some cases they may also cannibalize sales of existing devices, such as smartphones and PCs. There are also inherent risks in attempting to launch an entirely new class of device, as some manufacturers are doing, and failures may be both high-profile and costly.
- For content owners, some new types of devices represent important potential opportunities. For example, by publishing their digital content in the form of media tablet "apps", some newspaper and magazine publishers are starting to command higher online advertising rates than those they are charging on the Worldwide Web, and some are also seeing potential to move from the free access model of the Web to a charged access model on media tablet apps. On the other hand, other types of devices have so far proved more of a threat to content owners. For example, book publishers are seeing erosion of their pricing and major disruptions of their business model, as a result of making their content available for e-book readers – owing to the current dominance of a single player, Amazon, at the distribution end of the chain.

Which types of devices will benefit from mobile network connectivity? One factor that will determine the answer is the extent to which consumers will habitually carry a type of device around with them when they are away from home. In the following Figure, needs updating we position various types of devices according to two criteria that determine the likelihood of such behaviour:

- Versatility – how many different functions can the device perform? The more versatile a device, the more likely people are to carry it with them regularly, since a single multi-purpose device can obviate the need to carry multiple dedicated devices. However, note that the extent to which this advantage applies depends upon how well the versatile device performs its various functions. For example, the music players in some smartphones are now good enough to replace a dedicated music player completely. On the other hand, although it is possible to read books and journals on a net book or a tablet, these devices' displays are not optimized for lengthy reading sessions.
- Mobility – how easy is it to carry the device around? The smaller and lighter a device, the more inclined people will be to carry it with them whenever they leave home. Broadly speaking, consumers will habitually take something with them if it will fit

into a clothes pocket or a small handbag. They will occasionally carry something bigger and heavier that needs a larger bag, if there is a particular reason for taking it with them. Note, however, that there is an important distinction here between consumers and business users: many business users habitually carry a larger bag with them, such as a briefcase, and are therefore likely to carry bigger and heavier devices such as PCs more often.

Figure 1: Mapping the New Generation Mobile Devices



Source: IDC 2010

[i] The usage areas we included in the survey were: email/calendar, security, CRM, database, storage, collaboration, business intelligence, office productivity (word processing, spreadsheets, etc), IT systems or network management, application development, back-office (ERP, SCM, etc), IT infrastructure, and human capital management. The survey had 733 respondents.

[ii] The E2.0 market size data is from a dedicated study on behalf of the EU where IDC forecast the E2.0 market for 2015. The penetration rates use IDC published market data which currently extends only to 2014.