Economic and Monetary Affairs

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Internal Market and
Consumer Protection

Streaming and Online Access to Content and Services

Study for the IMCO Committee

Streaming and online access to content and services

STUDY

Abstract

As a result of technological progress in the area of cloud computing and mobile connectivity, Internet is increasingly offering an omnipresent and interactive - ubiquitous - access to information and content. This improved access is, in turn, leading to efficiency, innovation and a significant reduction of the environmental footprint through dematerialisation of consumption, with potential changes in the economic and societal landscape.

However, the current legal and economic setting in Europe is leading to a partitioning of mobile Internet access and Internet content along national borders, significantly affecting benefits that could be derived by Europeans from the Digital Single Market and preventing Europe from consolidating its comparative advantage on the global ICT market.

This document was requested by the European Parliament's Committee on Internal Market and Consumer Protection.

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EXECUTIVE SUMMARY

Streaming and online access to content enable ubiquitous access to vast collections of information gathered in commercial and governmental databases, without the need for a permanent transfer of data to and from a user's computing device, thus alleviating concerns of 'appropriation' of content by users.

Market trends indicate that consumers: 1) strongly favour this facilitated, multi-device and multi-platform mode of consulting content that does not necessitate maintaining content on specific hardware and where computing devices become 'invisible' to the user (natural computing operated through a natural user interface)[1], and 2) where the possibility exists to access legal content delivered through streaming or which is available online (largely depending on the availability of ubiquitous services), they prefer such access to content over illegal downloading.

In terms of percentage of Internet traffic generated by streaming, Europe is significantly lagging behind North America. In Europe, this space is taken over by Peer-to-peer (P2P) file sharing[2]. This indicates a missed opportunity to create markets for European creators, innovators and entrepreneurs, and to provide European consumers with legal digital products and services. It is estimated that approximately 22% of peak Internet traffic could be shifted from P2P filesharing to streaming. This figure will further increase as strong trends for the development of streaming continue.

The benefits of streaming and online access to content could be summarised through four aspects:

Table 1 : Benefits of streaming and online access

Benefits of streaming and online access
1. **Improved access to information and content**, with an exponential development of vast e-commerce and e-government databases allowing immediate and ubiquitous access to a variety of content in such areas as **consumer information**, health, dietary and well-being, integrated with improved product information; **augmented and immersive reality services** in such areas as cinematography, gaming, tourism, architecture or art; **ubiquitous government services**, such as business development centres, employment services, legal and tax compliance, online education and vocational training; and inexpensive **online dispute resolution** systems. These databases have significant potential for further development both in terms of quantity of information (further digitalisation) and quality (improved resolution of digital copies). Ubiquitous access gives further opportunities for automated administrative and financial compliance.
2. **Broadened access to European diversity**, in particular to European scientific and cultural resources, with the possibility to deliver content to users and consumers scattered around Europe, and to realise economies of scale.
3. Significant energy efficiency gains may be achieved in the area of transportation through **the substitution of transport by "virtual mobility"** and **dematerialisation of consumption**. Further gains result from the **reduction of information costs** - and therefore transaction costs - through facilitated, immediate and ubiquitous access to information that improves the

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[1] See: Transformative Consumer Technologies: Natural Computing; http://www.microsoft.eu/innovation-in-society/events/transformative-consumer-technologies-natural-computing.aspx.

[2] On legal issues see respectively: http://en.wikipedia.org/wiki/BitTorrent#Legal_issues and http://en.wikipedia.org/wiki/EDonkey_network.

Benefits of streaming and online access		
	outcome of transactions and leads to **efficiency**.	
4.	Transformation of Internet from an add-on to traditional commerce and governance with traditional pricing/delivery and participation models, to an independent information and content distribution channel providing efficient and environmentally-friendly solutions; and advancing **new economic and business models** based on collaborative information.	

However, with respect to the key enabling factors for the development of streaming and state-of-the-art access to Internet content, the Digital Single Market (DSM) is seriously impaired and partitioned into national markets.

Table 2 : State of the Digital Single Market

Concepts of ubiquitous access to information and	Description	Evaluation of current status of Digital Single Market
Access anytime	Cloud computing has enabled vast databases to be put in place and makes advanced and high performance computing available to consumers. However, transnational flows of data – essential for cloud computing - trigger significant uncertainties due to national regulatory barriers and a lack of international standards implementing cybersecurity, data protection and privacy provisions.	Important points of concern on differences in legal regimes in Member States.
Homogeneous connectivity - Access everywhere	Ubiquitous connectivity is essential for services based on access. However, the EU Internet connectivity market is principally national in character and divided into 28 national units. With respect to mobile connectivity – fundamental for ubiquitous access - roaming *de facto* excludes the use of streaming and significantly impairs online access to information and content in the Digital Single Market for consumers and users moving across the EU.	The DSM is significantly impaired by barriers to mobile connectivity due to roaming between Member States.
Homogenous access to content - Access to everything	In the past, the principle of free movement of goods, the exhaustion doctrine addressing intellectual property rights (IPR) and provisions of competition law effectively combatted those private practices, who were setting barriers against the free movement of goods covered by IPR. Now, however, the Digital Single Market is experiencing unprecedented partitioning in the area of digital goods/services. Territorial segmentation through the use of IPR is leading to refusals to sell or supply to customers from other Member	The DSM is significantly partitioned. Content accessible on national basis.

States, inaccessibility of linguistically diverse content, and the provision of nationally-selective content. Ultimately these barriers prevent the development of ubiquitous services.

The following recommendations could enforce European potential in the area of streaming and online access to content and services:

1. The EU's fixed and mobile data connectivity needs to be on a par with that of its competitors; in particular, Europe needs **clear mobile data connectivity objectives**, emphasis placed on LTE roll-out and roaming-free services, and a clear vision on next generation 5G mobile data services.

2. **The principles of free movement of goods and services need to apply fully in the area of online content**; currently the Digital Single Market is partitioned along national borders due to a lack of pan-European services and a refusal of passive sales by online distributors of digital content. This is not only detrimental to e-commerce, but also to the free movement of persons, as it deprives Europeans who have moved to another Member State of access to the cultural resources of their Member State of origin. Public authorities should address cases of refusal to sell or refusal to supply services, in particular where they are practiced by monopolistic suppliers.

3. While Europe is clearly lagging behind the US in terms of commercial offer and big platforms (such as Google, Facebook, Netflix), it has important **potential in terms of ubiquitous government**; some Member States, e.g. Estonia, are world leaders in this area. In order to fully exploit this potential, Europe needs a coordinated action rather than fragmented efforts in each of the Member States. The most obvious areas for action in this respect are e-Health, electronic product information, e-compliance (including e-tax and e-customs), online access to European cultural resources and online dispute resolution.

4. Ubiquitous services in the field of streaming and online access to content is an area where the focus of the Internal Market should be changed from removing internal barriers to showing **how the European dimension can be used to the benefit of European citizens**, requiring **more flexible understanding of the subsidiarity test**.

5. Considering the number of issues affecting the proper functioning of the Digital Single Market, there is a clear need for a **Single Market Act III focused on digital issues.**

6. Europe could consider **promoting hypermedia based payment systems** to remunerate authors and content providers on the basis of how often their content is consulted; this step could simplify a myriad of current initiatives that are based on approximate lump-sum remunerations or exemptions.

7. Europe needs to **attract cloud computing infrastructure** in order to enforce its Internet governance autonomy and better protect its businesses and citizens.

8. The exponential growth of the Internet into a ubiquitous Internet of Everything will also require comprehensive **net neutrality**, **cybersecurity** and **data protection** policies, in order to build up consumers' trust and safeguard the digital environment. These areas are parts of broadly-understood Internet governance, where the European Parliament has a special role to play in ensuring the international governance balance, thereby safeguarding the European role therein.

9. While regulation of ubiquitous computing, and in particular streaming and online access to content and services, encompasses such important areas as trade regulation and technological issues (e.g. interoperability), the European Parliament needs to safeguard **fundamental rights** embedded in European legal culture that could be affected in this areas (e.g. **privacy**).

1. DEFINITION AND DYNAMICS OF STREAMING AND ONLINE ACCESS TO CONTENT

Streaming is defined for the purposes of this note as delivering content that is continuously received by, and displayed to, the end user, while it is being delivered by the provider. Streaming media is multimedia data transferred in a stream of packets that are interpreted and rendered, in real time, by a software application as the packet arrives[3]. Continuity of transmission while the content is already being consulted and the lack of permanent transfer of data to the user computing device constitute distinctive features of streaming[4].

Both elements differentiate streaming from downloading[5]; although the distinction is increasingly blurred due to a shift in downloading services from traditional hardware-oriented data transfer and storage to ubiquitous solutions, such as acquiring rights to consult specific (acquired) content by the consumer through various devices, which are usually registered on a cloud computing platform and managed by an accounting system, electronic identification or digital identity[6], and by digital rights management[7]. Another similar concept, although focused on video content, is that of Video on Demand (VoD); defined as non-linear distribution services of dematerialised audio-visual content. Non-linear means that the content may be consumed independently of a programme, at the time chosen by a consumer. The methods of access are varied: e.g. to be viewed once or several times, downloadable on a media to own or to rent, or rented for a given period. Pay-per-View (purchase of a programme made available at a fixed time) is excluded from VoD[8]. Video on Demand may be streamed or downloaded.

Most streaming media systems operate on the client/server model. A client requests data from a server on a computer network, and the server delivers the data, which is interpreted by the client. In streaming media, audio and video data are encoded in a special format that shrinks the data to a manageable size. After the server delivers the data, the client renders the data and displays it as audio or visual information[9]. Streaming technologies like Adobe Flash, Apple QuickTime, and Microsoft Windows Media and Silverlight all include certain common components in their solutions. These include a player to play the media on

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[3]   Cisco Unified Consumer Voice Portal: Building Unified Contact Centers, Cisco Press, 2012. http://books.google.co.uk/books?id=NvsqLlbSAbQC&pg=PT310&dq=streaming+definition&hl=en&sa=X&ei=ZZgFUN_YDMTBhAf16K3TBw&ved=0CGUQ6wEwBjge#v=onepage&q=streaming%20definition&f=false.

[4]   Rayburn D., *Streaming and Digital Media: Understanding the Business and Technology*, Elsevier Inc., 2007, p. 24 (http://www.amazon.co.uk/Streaming_Digital_Media_Understanding_Technology/dp/0240809572/ref=sr_1_15?s=books&ie=UTF8&qid=1343050638&sr=1-15#reader_0240809572).

[5]   "On the Internet, there are two ways to listen to or watch audio and video files. The first way is to download the file to your computer and watch the file after it resides there. The other way to do it is to start a progressive download of the file, where the file isn't downloaded to your computer in a lasting way. This is called streaming. For instance, if you listen to a radio station online, you will stream the music, since you're listening live and couldn't download all the songs that they play. Instead, your computer connects to the radio station and receives an ongoing audio feed, or stream, with the radio station's programming. When you stream a file, you will get to listen to or watch it, but won't have the file on your computer to do things with later. Some websites offer streaming as a way to make their content available, but not let people have it without buying it." Sam Costello (2012). What is Streaming?: http://ipod.about.com/od/glossary/g/streaming_def.htm.

[6]   Increasingly digital identity services are being consolidated under one platform, e.g. Facebook or Google.

[7]   Diehl E., *Securing Digital Video, Techniques for DRM and Content Protection*, Springer, 2012, http://books.google.co.uk/books?id=J_liBj22RokC&printsec=frontcover&dq=Digital+rights+management&hl=en&sa=X&ei=1naaUPXPOcfBhAe6l4CADQ&ved=0CEkQ6AEwBThG.

[8]   Kern, Philippe, *The Impact of Digital Distribution – A Contribution,* KEA European Affairs, 2009, http://www.keanet.eu/docs/impactondigitaldistribution.pdf.

[9]   Follansbee Joe, *Get streaming!*, Elsenvier Inc., 2004, p. xvi, http://books.google.co.uk/books?id=pYlE8HapG4AC&printsec=frontcover&dq=streaming&hl=en&sa=X&ei=4JwFUJObKcmChQfhvP3mBw&ved=0CEMQ6wEwAQ#v=onepage&q=streaming&f=false (20/12/2013).

the viewer's computer or mobile device, a defined file format or formats that the player will play, and often a server component that offers features like digital rights management and live streaming. All streaming technologies use compression to shrink the size of the audio and video files so they can be retrieved and played by remote viewers in real time. Common video compression technologies, also called video codecs, include H.264, MPEG-4, VP6 and VP8, Windows Media Video (WMV) and MPEG-1/2, while common audio codecs include AAC (Advanced Audio Coding), Vorbis, Windows Media Audio (WMA), and MP3[10].

Streaming media most often refers to the transfer of audio and video data, though it can be applied to almost any other kind of data, such as static images and text[11]. This latter, broader scope is further referred to as **online access to content**, i.e. access without the permanent transfer of data to the user's computing device, regardless of technological means which assure that such transfer is avoided or managed ex-post.

This development indicates a "new approach of doing business based on access to services rather than the sale of products". This development goes hand in hand with a shift from industrial production to cultural production in which the focus lies on the marketing of cultural resources in the form of paid-for personal entertainment[12]. It is often referred to as **digital media revolution** consisting of a suite of digital, media-capable devices and services poised to deliver the promise of anywhere-anytime access to information[13].

The trend towards the digitalisation of information flow leads to the transformation of initial e-commerce and e-government (both originally functioning as electronic windows for physically-performed transactions, e.g. goods delivered and forms sent by post) into advanced e-commerce and e-government (operating exclusively on an electronic basis, e.g. electronic downloading of digital goods and services, and electronic internal and external transactions in administration), and subsequently into **ubiquitous commerce** and **ubiquitous government** (where rights to pervasive, fixed and mobile access to connectivity and services are defined by and centred around electronic identification and digital identity; thereby placing the user, rather than technology, in the centre[14]).

The **shift from electronic to ubiquitous** reflects the fact that the Internet is evolving into an ever more complex network, composed of highly-interactive and constantly-connected sensors, RFID tags (Radio Frequency Identification), processors and storage units that allow for the efficient, collaborative and interdependent exchange of information and content, involving citizens, businesses and administrations. In such a system, the possibility to download and "own" content on one's personal computer is much less important than the possibility to have **multi-platform access to a constantly-updated flow of collaboratively-produced information and content**, and to be able to contribute to it.

Data on internet traffic indicates a **strong trend towards greater usage of streaming and online access to content**. Comparing data on the composition of peak period traffic for fixed access Internet in Europe since 2009 (Figure 1) shows that aggregate traffic is

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[10] Ozer J., *What is streaming? A high-level view of streaming media technology, history, and the online video market landscape,* http://www.streamingmedia.com/Articles/ReadArticle.aspx?ArticleID=74052.

[11] Follansbee J., Get streaming!, Elsenvier Inc., p. xvi.

[12] Helberger N., *Controlling Access to Content: Regulating Conditional Access in Digital Broadcasting*, Kluwer Law International, 2005, p. 5 http://books.google.co.uk/books?id=FqOe3r9l17gC&printsec=frontcover&dq=online+access+to+content&hl=en&sa=X&ei=K5IGUNOZO8TYtAaUsa2GBw&ved=0CEIQ6AEwAQ#v=onepage&q=online%20access%20to%20content&f=false.

[13] Ce Zhu, Yuenan Li & Xiamu Niu, *Streaming Media, Architectures, Techniques, and Applications*, IGI Global 2011, p. XV.

[14] This development is illustrated e.g. by the increasing role one's Facebook identity plays in providing a digital identity across the Internet.

increasing for real-time entertainment services[15] such as video and music streaming. Traffic generated for real-time entertainment has been consistently increasing from 30.4% in 2009 to 33.2% in 2011 (Figure 1)[16] and 35.37% in 2012[17].

Figure 1: Peak Period Aggregate Traffic Composition (Europe, fixed access)
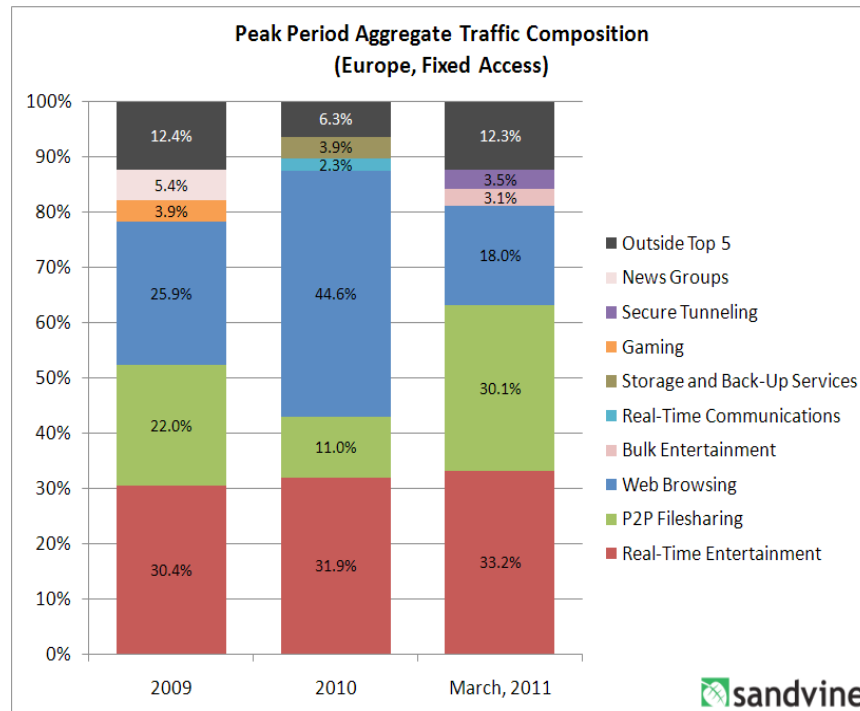
Source: Sandvine (2011). Global Internet Phenomena Spotlight: Europe, Fixed Access, Spring 2011. p. 8

In terms of percentage of Internet traffic generated by streaming, Europe is significantly lagging behind North America. While streaming in Europe accounted for 35.37% of total Internet traffic in 2012, in North America it reached 58%; doubling since 2009, mainly due to video streaming services like Netflix, which alone accounts for 32.9% of total downstream traffic during peak hours. Importantly, this service brings to consumers exclusively legal content[18]. In the case of North America, these developments indicate a boom in streaming and a significant reduction of peer to peer (P2P) filesharing, although this development is mainly concentrated on video streaming[19].
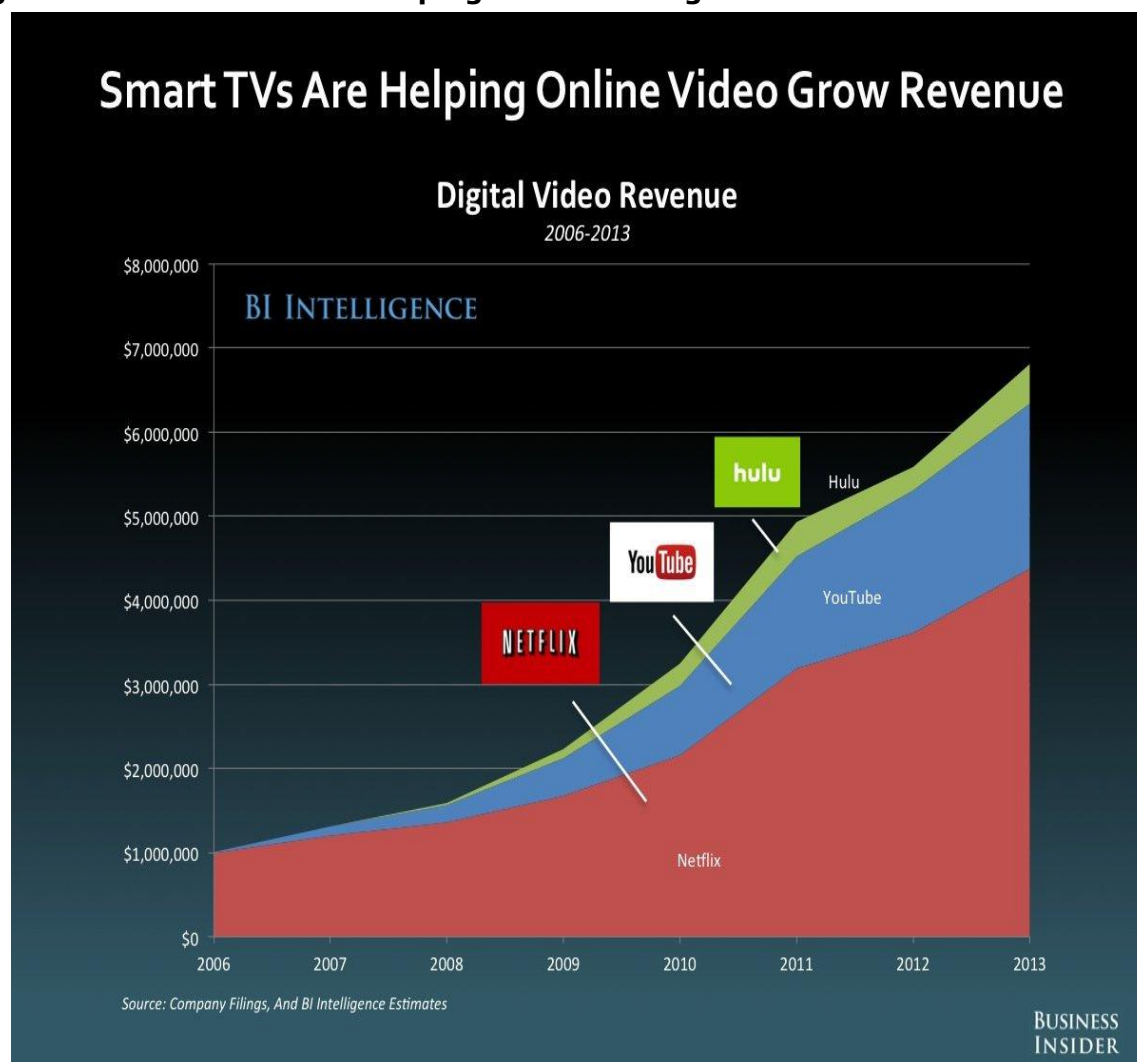
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[15] Applications and protocols, which allow "on-demand" entertainment that is consumed (viewed or heard) as it arrives.

[16] Sandvine (2011). *Global Internet Phenomena Spotlight. Europe, Fixed Access*, Spring 2011, p. 8. http://www.scribd.com/doc/55777280/Sandvine-Internet-Phenomena-Report-Spring-2011.

[17] Sandvine (2012). *Global Internet Phenomena Spotlight: Europe, Fixed Access*, p. 7.

[18] Indeed, it seems that the legal offer of Netflix covering TV shows and movies makes the difference in North America. Everywhere else in the world streaming is significantly less used, with YouTube being world leader in providing video streamed content.

[19] Similarly, consumers in Sweden shifted away from illegal filesharing, with the development of streaming services for music, see: Peter Tschmuck, *'is streaming the next big thing? an international market analysis'*, http://musicbusinessresearch.worldpress.com/2013//06/04/is-streaming-the-next-big-thing-an-international-market-analysis/; This is confirmed by further studies on increased willingness of consumers to pay for online content, see: The American Assembly, Columbia University (November 2011). *Copyright Infringement and Enforcement in the US*, http://piracy.ssrc.org/wp-content/uploads/2011/11/AA-Research-Note-Infringement-and-Enforcement-November-2011.pdf.

Figure 2:   Smart TVs are helping online video grow revenue

Source: Business Insider, available at: http://www.businessinsider.com/the-internet-of-everything[20]

Space created by the weakness of the legal streaming offer is taken over by P2P filesharing, which in Europe took 30.1% of Internet traffic while in North America constituted only 16.6% of the traffic in 2011, and further reduced to 12.7% in 2012.

Europe is **missing the opportunity** to create significant markets for European creators, innovators and entrepreneurs, and to provide European consumers with legal digital products. It is believed that approximately 22% of Internet traffic could be shifted from P2P filesharing to streaming if legal possibilities were available.

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[20]   Danova T., *The Internet of Everything, available at:* http://www.businessinsider.com/the-internet-of-everything-2014-slide-deck-sai-2014-2?op=1

Figure 3 : Peak period aggregate traffic composition (North America, fixed access)

Peak Period Aggregate Traffic Composition (North America, Fixed Access)
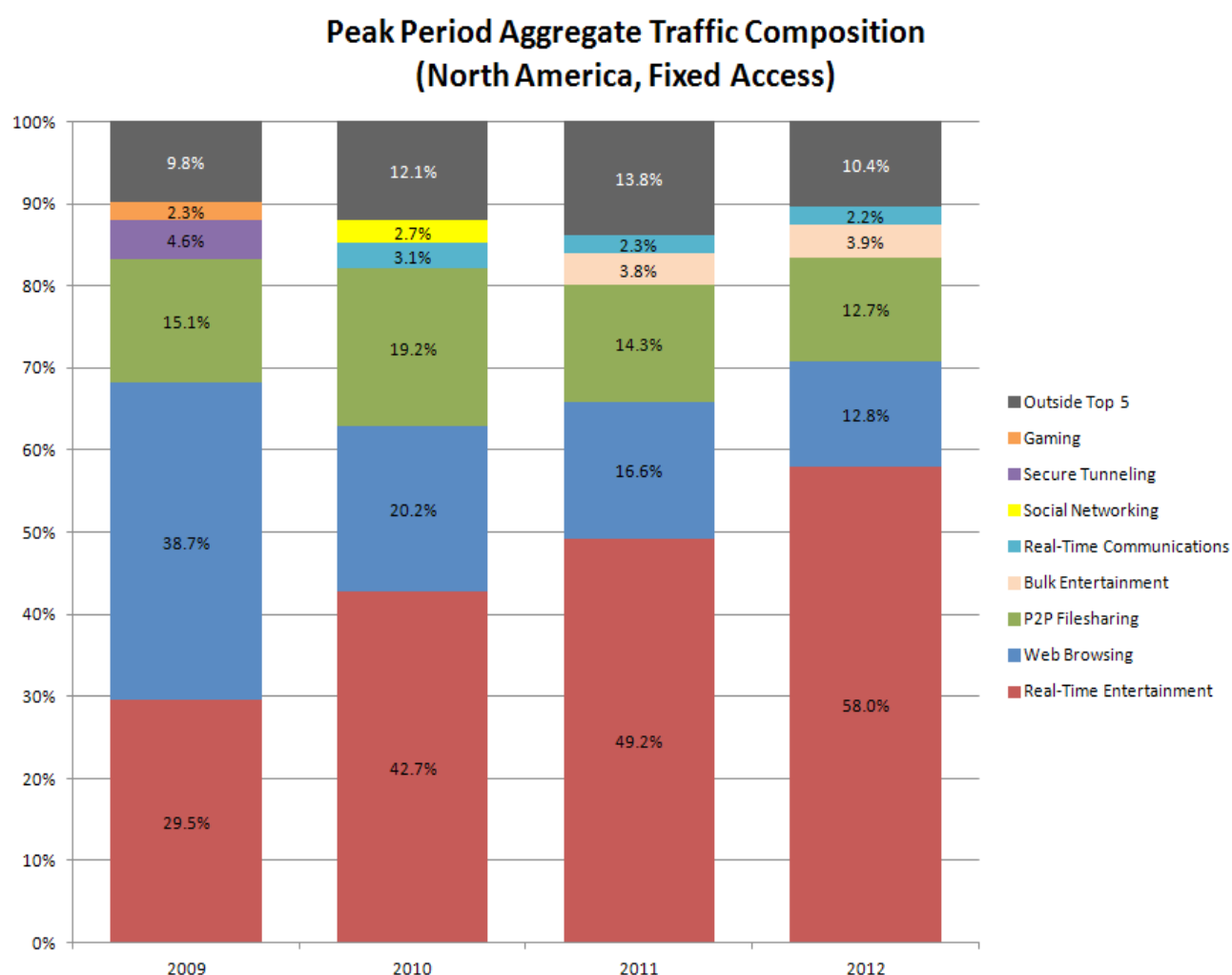
Source: Sandvine (2012). Global Internet Phenomena Spotlight: North America, Fixed Access, p. 7

This lost opportunity will grow as projections for the development of leading markets, such as the American market, for streaming are even more striking. They indicate that in the near future streaming will take over Internet, both on fixed and, even more importantly, on mobile networks[21].

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[21] Sandvine (2012). *Global Internet Phenomena Spotlight: North America, Fixed Access*, p 20 for fixed and p. 10 for mobile networks.

Figure 4: Fixed network traffic (US)
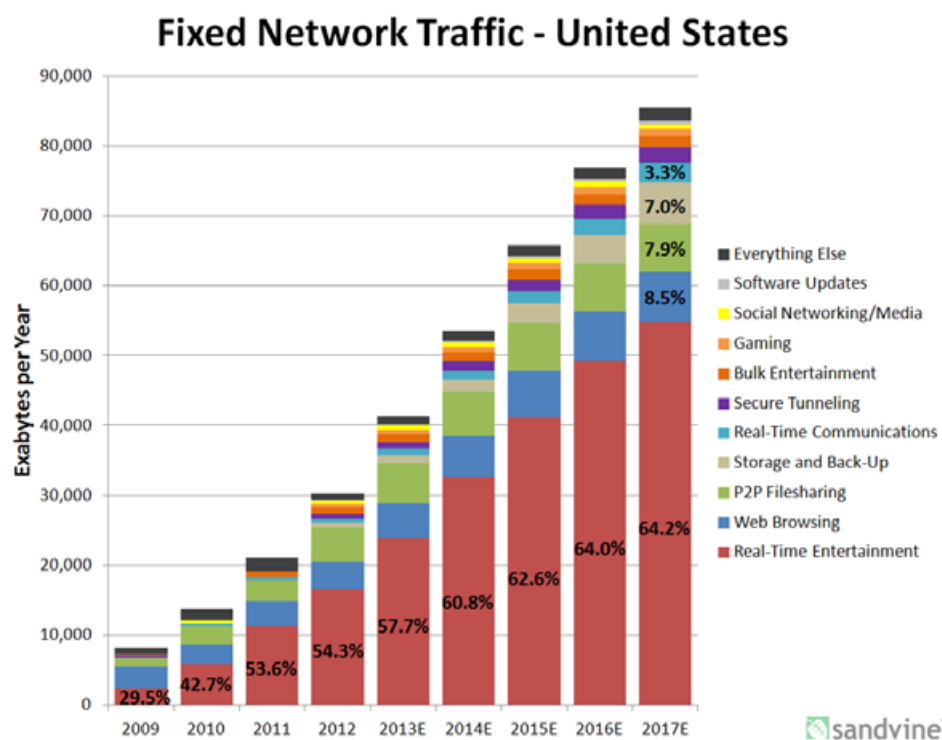
Source: Sandvine (2012). *Global Internet Phenomena Spotlight*: p. 10

2. BENEFITS OF STREAMING AND ONLINE ACCESS TO CONTENT

The strength of the trend towards streaming and online access to content is due principally to the **convenience of services available**. As explained by Lessing, '[w]hen it is *extremely* easy to connect to services that give access to content, it will be *easier* to connect to services that give you access to content than it will be to download and store content *on the many devices you will have for playing content.* It will be easier, in other words, to subscribe than it will be to be a database manager, as everyone in the download-sharing world […] essentially is'[22].

The main benefits of streaming and online access to content and services are the following:

- improved access to information and content,

- broadened access to cultural and linguistic diversity,

- increased efficiency in terms of immediate and ubiquitous access to information, and reduced environmental footprint of digital distribution, and

- new Internet-based collaborative business and administrative models.

2.1. Improved access to information and content

The Internet has led to a profound transformation in our ability to access information and content.[23] At the heart of this transformation are: digital convergence and a growing Internet network allowing for immediate, universal and interactive access to digital content regardless of geographical and physical barriers.

Information and content available through such media as printed books, journals, CDs or DVDs require physical mobility to be delivered and received. Today, however, they can be and, indeed, are often delivered electronically and increasingly in a mobile and ubiquitous way.

Below are some selected services based fully or partially on streaming and online access to content. The common feature of these services is that they offer **instant access to databases with unprecedentedly vast information and content**.

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[22] Lessing L., *How Big Media Uses Technology and the Law to Lock Down Culture and Control Creativity*, The Penguin Press, 2004, p. 298: http://books.google.co.uk/books?id=cxZp0sV3V80C&pg=PA298&dq=online+access+to+content&hl=en&sa=X&ei=Qg4IULmcGYfChAf2-p3GAw&ved=0CEQQ6AEwAjgy#v=onepage&q&f=false (19/7/2012).

[23] Access to information is one of the basic concepts in economics, law and scientific discovery, as discussed further in the section on efficiency.

Table 3 : Ubiquitous services[24]

Market services	One click away from
Books and press	Google: Books http://books.google.com/ with over 20 million titles[25]. 24symbols.com: http://24symbols.com[26]. Kindle: https://kindle.amazon.com with over 2 million titles that can be acquired and 350 000 titles that can be accessed against annual subscription.
Film and video	YouTube: http://www.youtube.com with approximately 3 billion videos online[27]. Lovefilm.com: http://www.lovefilm.com/ with 3 284 streamable movies and 589 TV seasons in the UK (compared to 13 185 streamable movies and 2 204 TV shows in the US on Amazon Prime, and 57 888 movies and 11 688 TV seasons on pay per watch)[28]. Netflix UK: http://www.netflix.com with 1 668 streamable films and 925 TV seasons in the UK (compared to 9 153 films and 4 989 TV seasons in the US; this marked difference in offer to American and European consumers is even more striking in the case of Amazon prime services, which already provide their American market with access to over 40 000 films and TV episodes for a small monthly fee, while their European service started in selected Member States on 26/02/2014 with only 12 000 films and TV episodes)[29]. BBC: http://www.bbc.co.uk/iplayer/tv. ARD: http://www.ardmediathek.de/. ZDF: http://www.zdfmediathek.de[31]. iTunes: http://www.apple.com/itunes with approximately 65 000 films and 250 000 TV programmes offered in the UK[32].

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[24] These are just some examples of ubiquitous services that illustrate vast information made available.

[25] "As part of its effort to make offline information searchable online, Google Inc." started digitally scanning books from the library collections of several US Universities in 2004, "so that users worldwide can search them in Google". The search results are displayed on a Google Books page and access to content is limited, depending on the copyright status of the respective book. Users get a full view of books that are out of copyright or if the publisher/author has agreed to make the book fully accessible. If publishers or authors have only authorised limited access to the book, users can only see a limited number of pages. See: http://www.google.com/press/pressrel/print_library.html and http://www.google.com/googlebooks/screenshots.html.

[26] 24symbols is a platform which streams books. The service is based on a subscription model according to which users can access and read books in the cloud for a monthly fee ("premium user") or for free with advertisements ("freemium user"). They can keep a library without downloading content and can share notes, quotes etc. via social networks. See: http://www.24symbols.com/docs/24symbols_technology_en.pdf.

[27] YouTube is a video-sharing website, which "allows billions of people to discover, watch and share originally created videos. YouTube provides a forum for people to connect, inform and… acts as a distribution platform for original-content creators and advertisers, large and small". While most of the content is uploaded by individuals, YouTube also has a "Partner Programme" through which bigger media associations such as the BBC or VEVO provide their content on the website, and which allows partnered content-creators to receive a share of the advertisement revenue generated by their content. Stringent territorial restrictions are applied to the availability of copyrighted content See: About YouTube (2012). http://www.youtube.com/t/about_youtube?hl=en-GB and YouTube Partner Programme (2012) and http://www.youtube.com/yt/creators/partner.html.

[28] This offer concerns directly streamable films, available via subscription in the UK, yet free for Amazon's Prime members in the US, http://techcrunch.com/2013/01/18/netflix-uk-has-far-more-tv-shows-series-than-lovefilm-instant-but-amazon-on-demand-service-has-twice-as-may-films/ (accessed on 3 July 2013).

[29] Lovefilm.com and Netflix UK both provide similar services, offering customers on-demand video streaming of movies and television series for a monthly subscription fee. Users have access to the services' online catalogues and can watch selected titles instantly online on a variety of devices. See: http://www.crunchbase.com/company/lovefilm and https://signup.netflix.com/MediaCenter/HowNetflixWorks.

[30] Television broadcasters increasingly make use of streaming technology and make part of their programmes and content available online to their viewers. Examples of this are BBC's iPlayer and the German broadcasters ARD and ZDF, which both have a "mediathek". Due to copyright and licensing issues, the availability of video and audio content is often of limited duration.

[31] Television broadcasters increasingly make use of streaming technology and make part of their programmes and content available online to their viewers. Examples of this are BBC's iPlayer and the German broadcasters ARD and ZDF, which both have a "mediathek". Due to copyright and licensing issues, the availability of video and audio content is often of limited duration.

Market services	One click away from
Music	Spotify: http://www.spotify.com with over 20 million music tracks available in 25 Member States[33]. Juke: http://www.myjuke.com with over 20 million music tracks available in 5 Member States[34]. iTunes: http://www.apple.com/itunes with approximately 26 million songs[35].
Games	Onlive cloud gaming: http://onlive.com[36]. GameTree TV: http://gametreetv.com/[37]. Xbox: http://marketplace.xbox.com/en-GB/Games/GamesOnDemand?SortBy=ReleaseDate
E-tourism	Google Maps and Street View: http://maps.google.com/maps?hl=en&tab=wl, offering among others, the possibility to virtually tour cities[38], museums and their collections (ArtProject[39])[40].

[32] iTunes only offers trailers or samples of films and TV episodes via streaming. However, this service was a pioneer of online access to content based on the proprietary model of acquiring content and multi-platform access to it. In addition to selling digital films and TV episodes online, iTunes offers digital rental services. iTune stores are national and redirect consumers to the store in the Member State of their residence. In addition to TV episodes and films, iTunes also offers apps, games and music.

[33] Spotify is a streaming service for over 20 million instantly-available music tracks, currently available in 25 Member States, but also in the US, Australia and New Zealand. Users can sign up and stream music from the online catalogue for free. Furthermore, users can get a premium account for a monthly subscription fee, which allows users to stream advertisement-free and unlimited music online as well as offline. Additionally, there is the possibility to buy and download tracks. See: http://www.spotify.com/uk/get-spotify/overview/ (20 December, 2013).

[34] See: http://247entertainment.com/sharejuke.html.

[35] The iTunes business model is a transition between old media models based on ownership and new business models. In addition to selling albums or songs, iTunes offers a vast library of samples that can be consulted before songs are bought and a multi-platform access, which is limited to the content that has been acquired on iTunes platform or downloaded on it. iTune stores are national and redirect consumers to the store in the Member State of their residence. iTunes also offers apps, TV episodes, films and games.

[36] Onlive is a "Cloud Gaming Network, which allows for the games to be rendered, stored and played from remote servers". Users can purchase a single game or gain unlimited access to games in the catalogue by paying a monthly fee (playpack subscription).

[37] "GameTree TV is the premiere on-demand Smart TV gaming platform, offering consumers an unprecedented user experience on their next generation set-top boxes and connected consumer electronic (CE) devices. It offers a catalogue of video games that can be accessed on-demand through a flexible and seamless transaction system, featuring a variety of pricing models billed directly through cable provider."

[38] See: http://www.google.com/intl/en/culturalinstitute/worldwonders/san-gimignano/.

[39] See: http://www.google.com/culturalinstitute/project/art-project?hl=fr.

[40] "Google Maps is a Google service offering mapping technology and local business information -- including business locations, contact information, and driving directions." Users can consult maps, satellite view, search for addresses and driving directions, find business information and may even view street-level imagery. See: About Google Maps (2012), http://support.google.com/maps/?hl=en, or http://www.google.com/intl/en/culturalinstitute/worldwonders/grand-canyon/.

Non-market services or mixed services	One click away from
E-government	European Parliament Webstreaming: http://www.europarl.europa.eu/ep-live/ [41]. UK single window for e-government: https://www.gov.uk/. Estonian single window for e-government: http://www.eesti.ee. French mon.service-public.fr: http://mon.service-public.fr[42].
Access to culture	Europeana: http://europeana.eu/portal/ with over 20 million digital items[43]. Internet Archive: http://archive.org/[44] with over 20 million books and 1 million full texts availability. World Digital Library: http://www.wdl.org/en/[45]with over 6 506 digital objects. Onleihe (Germany): http://onleihe.de[46].
E-learning	MIT opencourseware: http://ocw.mit.edu/index.htm[47]. Khan Academy: http://www.khanacademy.org/[48]. iTunes U: http://www.apple.com/apps/itunes-u/[49].

[41] The European Parliament offers both live video streaming and on-demand video streaming of plenary sessions, committee meetings, public hearings and workshops, etc. For an example of analysis concerning intelligent representation and retrieval of multimedia content in parliamentary activities see: Sanchez-Nielsen Elena and Chavez-Gutierrez Francisco, *Intelligent Multimedia Content Retrieval in Parliaments,* in Bourcier Danièle (eds.), *Intelligent Multimedia. Managing Creative Works in a Digital World,* European Press Academic Publishing, 2010*,* p. 337- 347.

[42] The French Government launched a web portal in 2001 (www.service-public.fr) serving as a manual on laws and procedures. In 2009 a personal portal was set up (www.mon.service-public.fr) enabling users to consult government documents (e.g. tax records and driver's licence renewals) and to complete administrative tasks. Since its launch, 2.5 million users have opened accounts on mon.service-public.fr. The administrative tasks that can be completed include the possibility to file taxes, pay fines, register as a job-seeker, and look up copies of diploma, certificates, or qualifications. Moreover, the French Government is planning to keep a digital copy of users' ID cards on their personal accounts enabling users to replace stolen or lost identity documents in an easier manner. It foresees that 80 per cent of those administrative steps, which are considered as priorities by users, will be available online by the end of 2012 (including requesting housing assistance or paying one's public bills). See: Ministère du Budget, des Comptes Publics et de la Réforme de l'Etat (26 September 2011). Amélioration de la relation numérique à l'usager p. 12, http://www.ladocumentationfrancaise.fr/var/storage/rapports-publics/114000574/0000.pdf; Invest in France Agency (July 2010). E-Government in France. http://www.invest-in-france.org/Medias/Publications/1171/ifa-e-government-in-france-july-2010.pdf (accessed 11 June, 2013).

[43] Europeana rolls multimedia library, museum and archive into one digital website combined with Web 2.0 features. It offers direct access to over 22 million digital objects such as: digitised books, audio and film material, photos, paintings, maps, manuscripts, newspapers and archival documents that are Europe's cultural heritage.

[44] The Internet Archive is a database with videos, audio recordings, photos, books and magazines, snapshots of archived Web pages, educational resources (courses, lectures, supplementary materials) available online. Over 20 million books are available with 1 million full texts.

[45] The World Digital Library is an international digital library operated by UNESCO and the United States Library of Congress currently holding 6 506 digital objects.

[46] Onleihe.de is a website of German public libraries allowing subscribers to borrow eBooks, ePapers, audio, music and videos online by downloading them and using them for a specific period of time. Users log in with their library account and download the respective content to their computers. The files have built in Digital Rights Management mechanisms (DRM), which disable their use after the lending period has expired.

[47] MITopencourseware is a website of the Massachussetts Institute of Technology that provides free lecture notes, exams and videos from MIT courses. Course materials reflect "almost all the undergraduate and graduate subjects taught at MIT".

[48] The Khan Academy is a non-profit organisation that offers free educational content that can be accessed online. The service includes a library of videos on mathematics, biology, chemistry and physics, finance and history. Moreover, there are interactive challenges and assessments available to anyone with an internet connection.

Non-market services or mixed services	One click away from
E-health	Electronic Health Record and Electronic Patient Portal (Estonia): http://www.digilugu.ee/portal/page/portal/Digilugu/ETerviseProjektid[50].
E tourism	Rijksmuseum: https://www.rijksmuseum.nl/en[51]. Louvre: http://www.louvre.fr/[52]. Uffizi: http://www.uffizi.com. Tate Gallery: http://www.tate.org.uk/. Prado: http://www.museodelprado.es.

While the above electronic databases and services are already available, they mark the beginning of digital developments, encompassing such areas as:

- **consumer information**, health, dietary and well-being considerations, integrated with improved product information and connected with e-health or lifestyle services[53],
- **augmented and immersive reality services**[54] in such areas as cinematography, gaming, tourism, architecture, art, or converged services merging different areas on the basis of gaming platforms,
- **ubiquitous government** services, such as business development centres, employment services, legal and tax compliance (in areas such as customs, VAT, income taxation),
- inexpensive and easily-approachable **online dispute resolution** systems.

On-line access to content and such services has brought access to worldwide databases with information, that in the past was reserved for few, required a lifetime to be gained, and necessitated long journeys and prolonged stays abroad. Today, it is immediately accessible, increasingly mobile and ubiquitous, while the main cost of it is the cost of attention and time spent consulting the content.

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[49] iTunes U provides educational audio and video materials, pdfs and e-books, see: http://www.apple.com/education/ipad/itunes-u/.

[50] Healthcare providers are required by law to send data to the Electronic Health Record. Apart from citizens, who can access their personal data, only licensed medical professionals have access the EHR. Patients have the right to opt out from having their data collected. The services available through the EHR and Patient Portal include consulting health records, DICOM (Digital Image Communication in Medicine), booking appointments, digital prescriptions and invitations to screening appointments. See: http://www.epractice.eu/files/eGovernmentEstonia.pdf, p`. 12.

[51] The official website of the Dutch National Museum in Amsterdam gives access to 125 000 high-resolution images of artworks available online, and invites the user to remix them thereby creating new images.

[52] The official website of the Musée du Louvre not only provides visitors with general information about opening hours, ticket and exhibitions, but also offers virtual tours of certain exhibitions online. Visitors may take a virtual stroll through the galleries and exhibition rooms in 3D and may take a closer look at pictures of the exhibits. See: Louvre Online Tours (2012). http://www.louvre.fr/en/visites-en-ligne (accessed on 11 June 2013).

[53] There are already numerous services with product information, nutrition habits trackers, calories calculators, shopping lists and food planning or food switching, see: e.g. http://www.bupa.com.au/health-and-wellness/tools-and-apps/mobile-apps/foodswitch-app.

[54] Furth B., *Encyclopedia of Multimedia*, Springer 2008, p. 287: http://books.google.co.uk/books?id=Ipk5x-c_xNIC&pg=PA282&dq=streaming+definition&hl=en&sa=X&ei=zZEFUK7oAYTT0QXuzd21Bw&ved=0CEkQ6wEwAg#v=onepage&q=streaming%20definition&f=false (17/7/2012).

'Shifting from ink on paper to digital text suddenly allows us to make perfect copies of our work. Shifting from isolated computers to a globe-spanning network of connected computers suddenly allows us to share perfect copies of our work with a worldwide audience at essentially no cost. About thirty years ago this kind of [...] global sharing became something new under the sun. Before that, it would have sounded like a quixotic dream'[55].

The following infographic by DOMO illustrates the scope of digital convergence in private markets[56]. Similar developments have taken place in the area of e-government with growth of government data and cultural data sponsored by various administrations[57].

Source: James J., *How Much Data is Created Every Minute?*, *available at*: http://www.domo.com/blog/2012/06/how-much-data-is-created-every-minute/?dkw=socf3

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[55] Suber P., *Open Access*, MIT Press, 2012, p. 1, http://www.amazon.com/Open-Access-Press-Essential-Knowledge/dp/0262517639/ref=sr_1_22?s=books&ie=UTF8&qid=1348216012&sr=1_22&keywords=access+to+information#reader_0262517639.

[56] See: http://www.visualnews.com/2012/06/19/how-much-data-created-every-minute/.

[57] See: Fleur van Veenstra A. et al., *Ubiquitous Developments of the Digital Single Market* Study prepared for the European Parliament's Committee on Internal Market and Consumer Protection, 2013.

The exponential expansion of information is particularly dynamic in areas where it is coupled with social media and crowdsourcing, thereby allowing users to share information or create content based on their experience or creativity. The trend in user-generated content is having a major impact on the value chain of the media and content industry[58]. The scale of such input ranges from trivial home-made videos to networks reporting in real time on product safety concerns or human rights violations (e.g. TripAdvisor, FoodSwitch or Ushahidi).

The Internet of Things ('IoT') brings with it a potential for further development: in IoT, content and information is produced by machine-to-machine interaction with a rapidly-growing amount of devices connected to the Internet.

Figure 5:   The 'IoT' - future developments
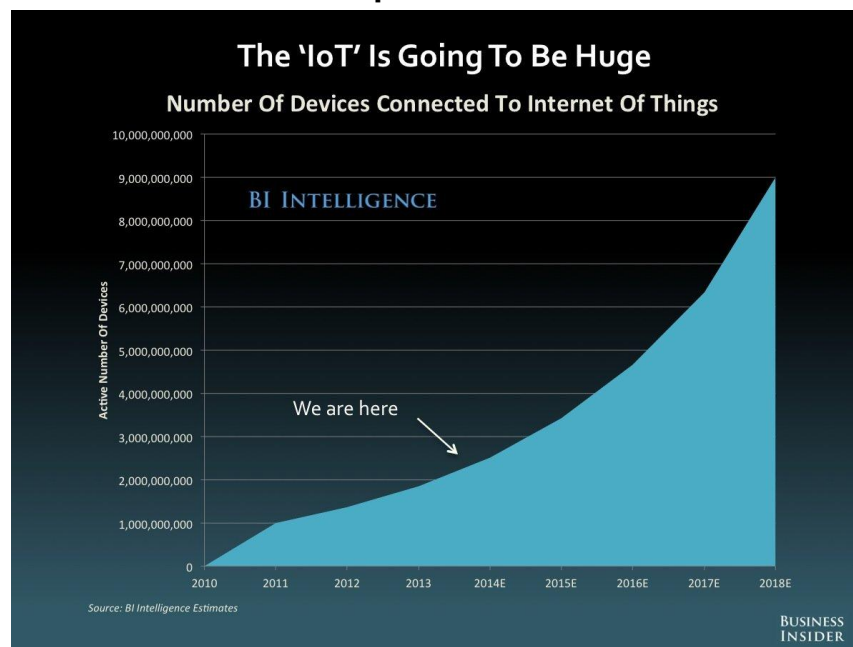
Source: Business Insider, available at: http://www.businessinsider.com/the-internet-of-everything [59]

While modern technology makes this access possible and increasingly sophisticated both in terms of mobile access and the amount of information passing through the Internet connection, **the scope of accessible information is far from being complete** and, where it has been put on the Web, conditions of accessibility vary strongly from free access to various models with paid content or content access where you must be a member of a particular group[60].

Instant access to vast information and content resources is the key feature of streaming and online services. While online access to specific (acquired) content already brings substantial benefits in terms of accessibility of content (although mainly following old media pricing models), it nevertheless makes a **disruptive difference** when, for example, access-based services offer the possibility to consult over 20 million music tracks for a fixed

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[58] McKenzie, P., Burlkell, J., Trosow, S., Wong, L., Whippey, C. & McNally, M. (2012): *User-generated online content 1: overview, current state and context*. First Monday, Volume 17, Number 6 – 4 June 2012, http://firstmonday.org/htbin/cgiwrap/bin/ojs/index.php/fm/article/view/3912/3266.

[59] Danova T., *The Internet of Everything, available at:* http://www.businessinsider.com/the-internet-of-everything-2014-slide-deck-sai-2014-2?op=1

[60] Halme K. et al., *The Role of Knowledge and Innovation Communities in the EU Research and Innovation Landscape*, Briefing note for European Parliament's Committee on Industry, Research and Energy, 2012, available at: http://www.europarl.europa.eu/committees/en/studiesdownload.html?languageDocument=EN&file=74251.

monthly fee as low as the price of one discounted album. The challenge in this case is that a consumer needs to subscribe to various subscription services, as they are often media-specific or limited territorially.

2.2. Broadening access to diversity

Broadening access to diversity at European level constitutes a specific aspect of expanding access to information. **The strength of Europe lies in cultural diversity that produces rich content in the divergent cultures and languages of twenty-eight Member States**. In order to benefit from this, European consumers need to have access to diverse legal on-line content and streaming services, either through non-discriminatory cross-border access or through a comprehensive pan-European offer. The first approach would, in general, benefit consumers already aware of content in other Member States, while the second could more actively promote national content in other Member States.

Examples of services giving access to culturally and linguistically diversified content are mainly ones provided or sponsored by **European institutions**, such as Europeana (which provides nationally diversified content in 31 languages), the European Parliament's streaming of plenary and committees' deliberations in all official languages, or Your Europe portal providing administrative and legal information in 23 national languages[61]. While **national e-government services** typically deliver services only in their national language, they do not limit access to content available on their Web sites, although they may require registration[62].

The European commercial offer has the potential to provide either national content available EU-wide or comprehensive EU-wide services with legal content, with at least twofold benefits: 1) consumers could become more aware of the cultural content created in other Member States; 2) citizens who move to another Member State could have full access to their home Member State's culture while living abroad. Offering European consumers these possibilities not only respects provisions on the free movement of goods and services, but can also enhance the free movement of persons. In addition, the quality of life could be improved for those Europeans, who decided to move to another Member State, but want to keep cultural and linguistic links with their Member States of origin, or have cultural and linguistic links with multiple Member States. This potential extends outside the borders of the European Union as Internet can offer access to worldwide cultural resources at close to zero distribution costs.

Examples of the potential offered by streaming and online access to content are: Google services (offering worldwide cultural resources through entry points drafted in 45 languages); or Wikipedia (offering its content in 287 languages). However, access to linguistically and culturally diversified copyrighted content is significantly limited by business models based on territorial segmentation. This affects the accessibility of commercial content, as well as scientific and research content that does not benefit from access models based on advertisement.

While, in principle, the unhindered flow of culturally diversified content should be assured within the borders of the European Union, **the EU is struggling to provide its citizens with a genuine Digital Single Market**. The European commercial offer is, in general, strongly fragmented along national borders. Providers of digital content not only refrain from targeting consumers outside delineated national territories (with a resulting lack of

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[61] See: http://europa.eu/youreurope.

[62] For comprehensive analysis of the limitations of national e-governance services see: Duke Ch. et al., *European Single Point of Contact,* Study prepared for the European Parliament's Committee on Internal Market and Consumer Protection, 2013.

comprehensive EU offers), but also use IP addresses, geo-location and geo-blocking, personal data and debit/credit card details to refuse passive sales to consumers from other Member States approaching them for culturally and linguistically diversified content[63].

2.3.   Efficiency

Streaming and online access to information and content is an efficient distribution channel. Efficiency is achieved through: 1) low cost of dispatching, sharing and receiving information (versus physical transportation requiring significant resources and energy), including low environmental costs due to substitution of transportation by virtual mobility and dematerialisation of consumption; and 2) facilitated, immediate and ubiquitous access to information (versus access postponed in time).

These benefits are most evident in the case of disabled and vulnerable consumers, consumers in rural areas and SMEs; in particular, in cross-border business transactions. However, transaction costs for gaining access to information and content could be significantly reduced for all market participants, by replacing traditional distribution channels requiring physical distribution and the physical collection of information and content, with streaming and online access[64].

Significant energy efficiency gains may be achieved in the area of transportation and dematerialisation of consumption[65]. In particular, energy efficiency may be achieved through the substitution of transport by "virtual mobility". The concept of dematerialisation on the one hand is related to the idea that not goods but information is travelling; on the other hand it is related to a concrete substitution of material goods by ICT products. Such virtual goods often refer to the dematerialisation potential of ICT for information goods; examples are the use of e-mail and the reading of e-books instead of using letters or reading books. In addition to transport-savings, both materials and energy are saved as there is no longer a need to produce and process these materials. Another example is the taxation or other services that can be used via Internet. Neither a personal contact nor a material letter is needed anymore. Such forms of e-government could have a significant impact on reducing GHG emissions through the dematerialisation of public service delivery: "For example, many paper-based services can be moved into the digital environment and situations where face-to-face interaction has been previously required (e.g. to prove identity) can be done virtually. There are also major energy efficiency gains to be achieved in the governmental supply chain" [66].

Virtual mobility will lead to increasing convergence between reality and digital content/information through augmented reality (the idea of enhancing one's environment virtually by the use of mobile devices, headgear or glasses with on-the-go Internet connectivity[67]), virtual reality (a computer-simulated environment that can simulate physical presence in places in the real world or imagined worlds) and immersive technologies (digital deeply interacting with senses). In particular, augmented reality will

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[63]   For comprehensive analysis of discriminatory practices see: Schulte-Noelke, H. et al., *Discrimination of Consumers in the Digital Single Market,* Study prepared for European Parliament's Committee on Internal Market and Consumer Protection, 2013.

[64]   This does not mean that traditional shops will disappear, but rather that a significant amount of them will be transformed into displays converging merchandise and digital services, while numerous virtual shops will mimic traditional shops, online.

[65]   Schippl J., Weinberger N., *Assessing the potential of ICT to increase energy efficiency and fight climate change – key technologies and prospects,* Study for Science and Technology Options Assessment, European Parliament 2008, p. 25-26.

[66]   Idem, p. 26.

[67]   Osborne Ch., *Will augmented reality technology be the next big trend?,* http://www.zdnet.com/will-augmented-reality-technology-be-the-next-big-trend-7000019439/

require instant access to massive information in order to assure instant interaction between reality, sensors, search engines and digitally stored information. Technologies developed for Google glasses, smartphones (e.g. Nokia's City lens) or GPS navigation[68] hint at potential of this area.

In a world where a countless number of physical objects and structures will be connected by sensors, augmented reality can serve as a visualisation medium that will make the sensor data situational, bridged to the real-world surroundings. Augmented reality not only has the potential to serve as an interface for traditional e-commerce (which is least interesting for energy efficiency[69]), but can also contribute to dematerialisation of consumption by providing a bridge to digital content in offline virtual shopping (e.g. through QR codes or object recognition). Virtual reality can reproduce existing urban landscapes, architecture and a variety of content digitalised in virtual reality. Examples of such large-scale project are: Japanese Earth Simulator, EU-funded Living Earth Platform[70] or commercial Google Earth[71]. Accessibility of information and content is crucial for a rich experience when using such services, and in turn content can be efficiently dispatched through such platforms.

Efficiency aspects of streaming and online access to content are not confined to reducing environmental footprint or to consulting content, but extend to positive effects in both reducing time and financial costs involved in consulting content. The cost of information is the basic concept of economics and the main factor of transaction costs. **Reduction of information costs - and thus transaction costs - through facilitated, immediate and ubiquitous access improves the outcomes of transactions and leads to efficiency**. Such outcomes are improved not only in individual economic activity (improved information on business and employment opportunities, research and expert networks, facilitated administrative and financial compliance, etc.), but also in the area of quality of life (including access to cultural heritage, participation in distant cultural events, site-seeing, and e-tourism, enhanced product information and online dispute settlement, e-health services and improved information on the environmental consequences of nutrition habits reducing the environmental impact per capita[72]). In legal doctrine, access to information is expressed by such fundamental principles as the principles of equality, principle of transparency, promulgation of legal acts and access to documents, as well as by the right of access to culture and cultural heritage, access to education and other quality of life concerns. Importantly, these economic and legal principles converge and serve the same overriding purpose of facilitation in exchange of knowledge.

Further, streaming and online access to content may be delivered with modified specific carbon intensity of technologies[73]. Currently, Internet technology is converging with renewable energies merging to create a powerful new infrastructure[74]. Importantly, the

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[68] http://www.engadget.com/2013/04/23/google-patent-virtual-reality-gps-navigation/.

[69] See:http://www.theglobeandmail.com/report-on-business/virtual-shopping-gets-real-at-toronto-subway-station/article4097553/.

[70] EU project aimed at a simulation, visualisation and participation platform to support the decision-making of policy-makers, business people and citizens – See: http://www.futurict.eu/.

[71] See: http://www.google.com/earth/explore/products/desktop.html.

[72] Mogensen L., Hermansen John E., Halberg N., Dalgaard R., *Life Cycle Assessment across the Food Supply Chain*, in Cheryl J. Baldwin (ed.), *Sustainability in the Food Industry*, Wiley-Blackwell 2009, p. 142, http://orgprints.org/15610/1/15610.pdf.

[73] Schippl J., Weinberger N., *Assessing the potential of ICT to increase energy efficiency and fight climate change – key technologies and prospects,* Study for Science and Technology Options Assessment, European Parliament 2008, p. 23.

[74] See: European Parliament's *Declaration on Energy and the Economy*, and Rifkin Jeremy, *The Third Industrial Revolution*, Palgrave Macmillian, 2011, p. 1.

Internet drives this conversion through a reduced environmental footprint in delivering information and content, both for consumption and productive collaboration.

Finally, further reduction of the environmental footprint may be achieved through the <u>inversion of proportions between energy consumed by ICT systems on computing and on cooling</u>.

2.4.   Changing the economic model

The concept of limited resources is the foundation of economic science. However, the **digital content escapes traditional economic assumptions**. In the domain of digital content, scarcity concerns consumers' perception that is limited while Internet resources experience an exponential growth. As indicated in the table above, every minute, 48 hours of videos are uploaded to You Tube, resulting in nearly 8 years of content uploaded every day, while 3 billion hours of videos are constantly watched each month by 800 million users[75]. The world contains an unimaginably vast amount of digital information, getting ever vaster ever more rapidly[76]. **Dematerialised content may be streamed and consulted an unlimited amount of times**. The technological possibility to access content at any time, when necessary, with **close to zero distribution costs**, calls for new media business models that will economically enable such access, and legislative intervention, where market failure would not allow for such solutions to develop.

We are currently experiencing a fundamental shift in market reality triggered by the rise of new technologies. As illustrated by Rifkin. "[i]n the new era, markets are making way for networks, and ownership is steadily being replaced by access. […] This doesn't mean property disappears in the coming Age of Access. […] Property continues to exist but is far less likely to be exchanged in markets. Instead, suppliers hold on to property in the new economy and lease, rent, or charge administrative fee, subscription, or membership dues for its short-term use. The exchange of property between sellers and buyers – the most important feature of the modern system – gives way to short term access between servers and clients operating in a network relationship"[77]. "In a distributed and collaborative economy […] the right of access to global social networks becomes as important as the right to hold on to private property in national markets"[78]. However, such **access**, if it is supposed to be meaningful and inclusive, cannot be limited to network access or social media access, but **should extend to information and content** in general. Furthermore, being information-rich no longer only means having the right to access information, but also the chance to produce, distribute and sell information[79].

In a traditional economy, market exchange takes place at a price that strikes an equilibrium between demand and supply. A limited amount of products or services coupled with demand on the market sets the market price. Limiting output leads to price increases and is, therefore, an interesting business strategy leading to an assumption that scarcity creates value.

Instead, existing information and content (streamable or accessible online) can be supplied, and multiplied an unlimited amount of times. The price could therefore be kept at a marginal level, as the final financial award could depend directly on **how often content**

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[75]   YouTube Statistics (2012). http://www.youtube.com/t/press_statistics/.

[76]   *Data, data everywhere*, Economist: Special report of 2/8/2012, http://www.economist.com/node/15557443.

[77]   Rifkin J., *The Age of Access*, Jeremy P. Tarcher/Putnam, 2001, p. 4.

[78]   Rifkin J., *The Third Industrial Revolution*, Palgrave Macmillian, 2011, p. 214.

[79]   Chandra R., *Information Technology in 21st Century, Universal Access to Information Resources*, Kalpa Publications, 2003, p. 3, http://books.google.co.uk/books?id=f_721uFgFcwC&pg=PA2&dq=access+to+information+as+economic+concept&hl=en&sa=X&ei=UQaqULHiLcyShgfQuYGoAQ&ved=0CDcQ6AEwAA#v=onepage&q=access%20to%20information%20as%20economic%20concept&f=false.

has been consulted; thus **enhancing exchange, rather than scarcity**. Importantly, ICT systems deliver precise mechanisms allowing one to verify the amount of times specific content has been consulted.

Traditional business models are built around profit maximisation. Innovation is not at the heart of traditional business strategy, but on its margins. Its function is to develop new products and services that in the future will move into mainstream business allowing profit maximisation to continue. **Ubiquitous models are focused on reaching out to new consumers** (rather than exploiting existing ones), on innovation expanding the offer with new products and on attracting consumers' attention to specific information and content, in order to maximise the amount of times it is consulted. The success of ubiquitous models is based on the fact that **the economy is fundamentally determined by people's willingness to exchange goods and services**. This willingness is **driven by innovation** (with new streams of supply and demand) and **secured by freedom of contract, legal certainty and the State of law**: continuously closing scarcity gaps through **improving knowledge about resources is its key feature**.

Old media are based on the traditional economy, with significant distribution costs and market partitioning, while the new open culture points at a willingness to create and share[80]; thereby encouraging creators to give access to their content for free.[81] Against the opposition, between the old media and the open culture, arouse a concept of hypermedia according to which instead of buying digital media for remuneration, copying it and fictitiously "owning" it, we could instead pay authors a small amount each time we access content they have created[82]. This could lead to a social contract in which information and content would have a value corresponding to the new collaborative economy, instead of being valued on the basis of old economy models or being free. Everyone would pay to download information/content at reasonable prices – and would get paid for uploading their information/content. This arrangement would 'celebrate personhood in full, because personal expression would be valued'[83].

The current raise in subscriptions for music and video streaming could constitute an intermediate step towards hypermedia based payment systems. Instead of a social contract, there is a number of commercial contracts, operated by such large-scale operators as Spotify or Netflix, who collect a fixed fee from their subscribers (or a fee from advertisers) and pay authors a small fee for each time creative content is streamed, "based on [a] deal struck between the label and [service provider], and then the label's [...] individual contract with each of its artists"[84]. They separate the concept of 'legal access to music from the old-age paradigm of paying the artist for an entire song or album. Subscription offers a different model of return on investment for artists and record labels. In the à-la-carte environment, an album or track is downloaded once and paid for. The price for digital content is often close to the price for physical album, despite the fact that digital content profits from significantly lower distribution costs. In the streaming environment, a track or album may be listened to hundreds of times; each triggering a payment to rights holders. While the individual payment for a stream is significantly lower than a download, the cumulative payment triggered by a consumer repeatedly listening to

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[80] See: Clay Shirky speech on *How cognitive surplus will change the world*:
http://www.ted.com/talks/clay_shirky_how_cognitive_surplus_will_change_the_world.html (25/7/2012).

[81] For an open science version see: Michael Nielsen speech at: http://www.ted.com/talks/lang/en/michael_nielsen_open_science_now.html.For open source and open information see Ushahidi's web site: http://www.ushahidi.com/.

[82] Lanier J. *You are not a gadget*, Penguin Books Ltd. 2011, p. 101.

[83] Idem.

[84] Paul M., *Debate rage as Spotify, MOG and Rdio kill / save the music industry*.
http://www.theverge.com/2012/1/26/2740981/debate-spotify-mog-rdio-kill-save-music-industry.

an album or track may be higher over a longer period"[85]. Payment clearance is enabled by accounting systems that can calculate the actual use of content serving as a basis for author's remuneration.

The success of subscription services indicates there is a trend towards switching to services based on access to information and content rather than acquiring "ownership" thereof. The number of consumers subscribing to music services globally is estimated to have increased by nearly 65 per cent in 2011, reaching more than 13 million, compared to an estimated 8.2 million the previous year. Subscription has caught on exceptionally well in some markets, particularly in Scandinavia. In Sweden, for example, subscription accounted for 84 per cent of digital revenues in the first 11 months of 2011, boosted by its national champion Spotify. Other markets saw sharp growth in subscription revenues; including France which saw an increase of more than 90 per cent in the first 11 months of 2011 (SNEP)[86]. Importantly, markets with an increase in subscriptions also experience important reductions in the problem of piracy, as well as an increasing willingness among consumers to pay for content online[87], notably live entertainment[88].

However, subscriptions raise their own points of concern. For example, combining fixed subscription fees with individual payments made each time content is streamed may lead to criticism of not always being transparent when distributing profits[89]. Another concern is that currently subscription schemes are media-specific, and while for music there is quite a significant degree of content consolidation, other media do not benefit from such consolidation and, therefore, users would need to acquire not only several subscriptions to cover different media, but also several subscriptions to achieve a comprehensive coverage of a specific media.

Solutions to these issues can probably be developed by the market itself through competition and consolidation; although special concern needs to be given to such threats as the monopolisation of platforms or content.

Alternatively, consumers could be provided with a public subscription service. Recently, a briefing note prepared for the European Parliament's Committee on Culture and Education advocated a content flat rate as a solution to illegal file sharing and as an opportunity for rights holders to provide consumers with the possibility of engaging in legal P2P file sharing[90]. While this solution seems focused on file sharing (which as already discussed is losing importance in competition with access-based channels of distribution of content), the idea of a flat rate scheme, providing fair remuneration for content, in addition to a connectivity fee is interesting. Such a scheme could be initiated by a regulator and coupled with an accounting scheme allowing for the precise measuring of how content is accessed by consumers with a resulting precise repartitioning of remuneration to different contributors to the content. It could stop current fragmented, sectorial and approximate attempts to tax the Internet (e.g. French or Spanish initiatives on 'Google tax') and remove

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[85] IFPI. *Digital Music Report 2012. Expanding Choice. Going Global*, p. 12. http://www.ifpi.org/content/library/DMR2012.pdf.

[86] IFPI. *Digital Music Report 2012. Expanding Choice. Going Global*, p. 10. http://www.ifpi.org/content/library/DMR2012.pdf.

[87] The American Assembly, Columbia University (November 2011). Copyright Infringement and Enforcement in the US. http://piracy.ssrc.org/wp-content/uploads/2011/11/AA-Research-Note-Infringement-and-Enforcement-November-2011.pdf.

[88] European Commission (May 2009). Final Report on the Content Online Platform. http://ec.europa.eu/avpolicy/docs/other_actions/col_platform_report.pdf.

[89] Paul M. (26 January, 2012). *Debate rage as Spotify, MOG and Rdio kill / save the music industry*. http://www.theverge.com/2012/1/26/2740981/debate-spotify-mog-rdio-kill-save-music-industry.

[90] Modot A. et al., *The "Content Flat-Rate": A Solution to Illegal File-Sharing?*, A Briefing Note prepared for the European Parliament's Committee on Culture and Education, 2011, p. 5.

current discussions on issues such as private copy, copy levy, piracy, market fragmentation along national borders, limited access to content and fairness of remuneration.

Whether developed by the market or by a regulator, subscription schemes could serve as testing beds for a genuine hypermedia-based system, which, if coupled with dematerialisation of consumption, would have a major impact on Europe as content and innovation provider, and could focus economic and societal developments on creativity and innovation[91].

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[91] Himanen P., *Challenges of the Global Information Society,* in Castells Manuel and Cardoso Gustavo (eds) *The Network Society. From Knowledge to Policy,* Center for Transatlantic Relations, 2006, p. 349.

3. KEY ENABLING FACTORS AND CHALLENGES FOR THE CURRENT DEVELOPMENT OF STREAMING AND ON-LINE ACCESS TO CONTENT

Effective development of streaming and online access to content is at the same time enabled and restrained by three main factors: cloud computing, mobile Internet connectivity and payment systems. The significant impact of these factors can be illustrated by the fact that mobile Internet and cloud computing are considered to be among the top five disruptive technologies with the biggest potential economic impact, including consumer surplus[92].

3.1. Cloud computing

Cloud computing is a model for enabling **ubiquitous on-demand network access to a shared pool of computing resources such as infrastructure, platforms and software[93].**

The impact of cloud computing on information dissemination is enabled by the **collaborative and ubiquitous character of cloud-based data centres.** These allow for information to be fed into databases, shared and actively distributed to the targeted audience for numerous purposes according to pre-established criteria. Information can be collected from and distributed to multiple platforms and devices, in particular mobile devices, based on e-identification serving as a principal instrument for the management of access rights. This means that information is instantly shared by many users, being attributed by means of electronic identification to predefined individuals, groups or communities, and made available regardless of location.

The right of access in terms of contributing, sharing and receiving information is at the heart of cloud computing based services, constituting the key element both from a technological and legal standpoint.

The main benefit delivered by cloud computing is that it allows consumers and businesses scaling access - both through their individual devices and via fixed or mobile data connectivity (confronted with roaming barriers) - to an unprecedented concentration of computing power and databases, and a collaborative sharing of a constantly-evolving flow of information available on cloud services.

Cloud technology primarily has potential to change patterns of consumption, create new products and services, and drive economic growth or productivity. It can also shift surpluses from producers to consumers, but this poses new regulatory and legal challenges[94]. Among underappreciated effects of cloud computing is its potential to **change the quality of life, health and environment**, and to change the nature of work and comparative advantage for nations[95].

Although predominantly positive in its impact, cloud computing generates risks that need to be tackled such as: threat of **lock-in and monopolisation of platforms**; non-transparent protocols for allocating computing resources and storing information within the Cloud; threats to **data confidentiality** due to the concentration of data on common cloud

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[92] McKinsey Global Institute, Disruptive technologies: Advances that will transform life, business, and the global economy, p. 12, http://www.mckinsey.com/insights/business_technology/disruptive_technologies.

[93] Fielder A. et al., *Cloud computing*, Study prepared for the European Parliament's Committee on Internal Market and Consumer Protection, 2012, p. 8, http://www.europarl.europa.eu/committees/en/studiesdownload.html?languageDocument=EN&file=73411.

[94] McKinsey Global Institute, *Disruptive technologies: Advances that will transform life, business, and the global economy*, p. 20.

[95] Idem, ibidem.

infrastructure; the loss of IT control and governance of cloud services; an increased risk of data interception in authentication and transmission procedures; as well as risks of technical failures in cloud centres[96], or loss of data due to commercial conditions. For European consumers these vulnerabilities are particularly important since the majority of consumer-oriented cloud services are US-based. This means that data traffic and storage is directed to the US territory and contractually many of the services fall under US law and jurisdiction; adding to the concern that Internet governance in general is principally US-based (restricted definition of Internet governance). By consequence, vulnerabilities need to be carefully addressed through provisions on data portability; differentiation of the level of security needed depending on the sensitivity level of data or the use of a 'private cloud'; standardisation; systematic auditing and certification of cloud services; as well as consumer protection (broad definition of Internet governance). In addition, successful Internet platforms have a strong tendency towards monopolisation, due to the convenience of coming back to the same window.

On a European level, cloud computing was addressed in the European Commission's Communication on 'Unleashing Potential of Cloud Computing in Europe'[97] indicating three key actions: 1) cutting through the jungle of standards; 2) safe and fair contract terms and conditions; and 3) promoting common public-sector leadership through the European Cloud Partnership. Cloud computing has also been examined in the extensive work of the E-Commerce and Digital Single Market Working Group of the Internal Market and Consumer Protection (IMCO) Committee of the European Parliament, both in Parliamentary resolutions[98] and studies[99]. Their findings also highlight governmental and commercial developments towards ubiquitous society and a need for a ubiquity test for all areas of European policy making, in order to assure efficiency and coordination of policy making and to prevent further partitioning of the Digital Single Market. Particular focus should be placed on such areas as e-identification and authentication schemes, e-health, e-VAT and e-Customs, as well as on e-learning and smart cities[100].

3.2.   Ubiquitous Internet connectivity

Mobile Internet connectivity is a relatively new phenomenon that evolved through rapid deployment into a 'connect everything' concept[101]. Mobile Internet primarily has the potential to change patterns of consumption, create new products and services, and drive economic growth or productivity. It can also change the nature of work, change

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[96] New York Times (1 July, 2012). *Amazon's cloud service is disrupted by a summer storm*.
      http://www.nytimes.com/2012/07/02/technology/amazons-cloud-service is disrupted by a summer-storm.html
      (accessed 2 July, 2012).
[97] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Unleashing the Potential of Cloud Computing in Europe , 27/9/2012, COM (2012) 529 final.
[98] The European Parliament Resolution of 11 December 2012 on completing the Digital Single Market (2012/2030(INI)) recognises the major potential of cloud computing, and calls on the Commission to propose without delay a European strategy on the matter (point 40). Also the European Parliament Resolution of 4 July 2013 on completing the digital single market (2013/2655(RSP)) emphasises the importance of the European cloud computing strategy, given its potential for EU competitiveness, growth and job creation. Furthermore, it stresses that cloud computing, since it involves minimal entry costs and low infrastructure requirements, represents an opportunity for the EU IT industry, and especially for SMEs, to take the lead in areas such as outsourcing, new digital services and data centres (point 4).
[99] See: Fielder A. et al., *Cloud computing*, Study prepared for the European Parliament's Committee on Internal Market and Consumer Protection, 2012.
[100] See: Fleur van Veenstra A. et al., *Ubiquitous Developments of the Digital Single Market*, Study prepared for the European Parliament's Committee on Internal Market and Consumer Protection, 2013.
[101] Connecting everything: A conversation with Cisco's Padmasree Warrior, http://www.mckinsey.com/insights/high_tech_telecoms_internet/connecting_everything_a_conversation_with_ciscos_padmasree_warrior.

organisational structures and shift surplus from producers to consumers[102]. Among underappreciated effects of mobile Internet connectivity is its potential to **change quality of life, health and environment[103].**

Streaming and state-of-the-art online access to content services has been enabled by **significant progress in connectivity speeds** allowing distant servers to store and offer immediate access, and real-time transfer of data. Progress first occurred in fixed Internet connectivity with commercially-deployed offers currently reaching 1000 Mb/s.[104] Most remarkably, the development of Long-Term Evolution (LTE) in the area of mobile Internet connectivity allows for speeds reaching 300 Mb/s, and soon this will rise to 1 Gb/s in LTE Advanced solutions. In South Korea, these technological achievements correspond to **10 Gb/s for the fixed network** and **1Gb/s for the mobile network** targets for 2020, coupled with research on **5G** networks and increased processing speeds designed to deliver next generation immersive content as part of the Giga Korea strategy[105]. Important Internet traffic generated by streaming needs to be subject to consistent net neutrality policy that guarantees non-discriminatory treatment of the traffic.

At these speeds, today's Internet is evolving from a myriad of distant, largely stand-alone computing devices with low connectivity capacity, into a global supercomputer composed of highly interactive, constantly connected and easily extendable sensors, processors and storage units. This facilitates an intense and interdependent data exchange, involving administrations, businesses and citizens, and offers a platform for efficient information and content distribution[106]. Improved mobile connectivity is a game-changer, turning mobile computing devices into life hubs, and personal knowledge and entertainment centres. It also enables ubiquitous access to databases rich in information and content, as well as mobile information dispatching[107].

While, by its nature, such a highly-responsive Web is global, it should have at least a European dimension offering European consumers, businesses and administrations the benefits of an improved access to information Europe-wide. Indeed, when a European is travelling, his or her need for data is likely to be *greater,* not *less*, than when at home[108].

A recent Global Mobile Data Traffic Forecast published by Cisco indicates that global mobile data traffic will increase 13-fold between 2012 and 2017. Mobile data traffic will grow at a

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[102] McKinsey Global Institute, *Disruptive technologies: Advances that will transform life, business, and the global economy*, p. 20.

[103] Idem, ibidem.

[104] See: Google Fibre project at http://fiber.google.com/about/.

[105] http://www.computerweekly.com/news/2240183948/Samsung-unveils-5G-technology (20/12/2013).

[106] According to Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2011–2016 "[c]urrently, a 4G connection generates 28 times more traffic than a non-4G connection. There are two reasons for this. The first is that many of the 4G connections today are for residential broadband routers and laptops, which have a higher average usage. The second is that higher speeds encourage the adoption and usage of high-bandwidth applications, so that a smartphone on a 4G network is likely to generate 50 percent more traffic than the same model smartphone on a 3G or 3.5G network.".

See: http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-52 0862.html.

[107] Little A.D., *LTE Network and Spectrum Strategies, Strategic Options for Mobile Operators in 4G Mobile Networks*, 2012,http://www.adlittle.com/downloads/tx_adlreports/ADL_LTE_Spectrum_Network_Strategies.pdf

[108] Marcus J.S., Nooren P., Philbeck I., *State of the Art Mobile Internet Connectivity and its Impact on e-Commerce*, Study prepared for the European Parliament's Committee on Internal Market and Consumer Protection, 2012, p. 7. Examples of current use of mobile applications in the briefing note are: navigation applications with pointers to local facilities and services; information on public transport; on-line check in services; restaurant, shopping, art, music, hotel, culture and city guide applications; radio and TV applications; on-line translation tools; Internet banking. Future applications will encompass advanced e-Health and e-Government services.

compound annual growth rate (CAGR) of 66 percent from 2012 to 2017, reaching 11.2 exabytes per month by 2017[109].

However, the Single Market for connectivity is fragmented along national borders and does not match accelerated technological capability. European consumers and businesses are exposed to high roaming charges that deprive them of the possibility to use cross-border mobile data connectivity in a meaningful way. The EU connectivity target for 2020 with download rates of 30 Mbps for all EU citizens and at least 50% of European households subscribing to Internet connections above 100 Mbps by 2020 lacks focus on mobile component. It is not following the global trend towards ultrafast mobile connectivity and is particularly striking in a European context.

According to Cisco, traffic generated by an average smartphone, a 4G smartphone and a tablet was respectively 342 Mb, 1.302 Mb and 820 Mb in 2012. Roaming solutions available for such data transfer on most Member States' markets are very costly despite substantial efforts at European level to reduce them.

For instance, the cap retail price of such transfers generated entirely while roaming would be EUR 239,4 for an average smartphone, EUR 911.4 for a 4G smartphone and EUR 574 for a tablet per average monthly usage. These figures reflect the currently binding Roaming III Regulation, which for the first time seeks to address high prices for mobile data roaming.

Table 4: Costs of roaming - monthly estimate for 2012

Device	Average traffic generated monthly in 2012	Cap price according to EC proposal for 2012[110]	Cap price reduced from EUR 0.9 to 0.7 per Mb after EP negotiations[111]
Average smartphone	342 Mb	EUR 307.8	EUR 239.4
4G smartphone	1,302 Mb	EUR 1,171.8	EUR 911.4
Tablet	820 Mb	EUR 738	EUR 574

A similar national data package within a Member State could be acquired for between EUR 5 and EUR 15.

Undoubtedly, price caps have driven market prices down from previously prohibitive levels and Europeans have greatly benefitted from them. The reform was largely welcomed by the population at large, as it was broadly recognised that data roaming charges before Roaming III Regulation were excessively high. However, ubiquitous connectivity and access to Internet anywhere and anytime is still disrupted even with capped prices. Many Europeans still turn off their data roaming when they cross national borders into another Member State with a resulting loss of access to information at exactly the moment when they need it the most. The consumers' situation is aggravated by the fact that mobile

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[109] Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2012–2017, p. 3, http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-520862.pdf.

[110] Proposal for a Regulation of the European Parliament and the Council on roaming on public mobile communications networks within the Union, COM (2011) 402 final, art. 12.

[111] Regulation of the European Parliament and the Council of 13 June 2012 on roaming on public mobile communications networks within the Union recast), Official Journal L 172/10, art. 13(2).

phones bundled with contracts are often blocked against other SIM cards, excluding the possibility to simply replace the SIM card after crossing national borders.

Importantly, as indicated above, global trends in mobile data traffic foresee very dynamic increases in the coming years[112].

Figure 6 :   Exabytes per month
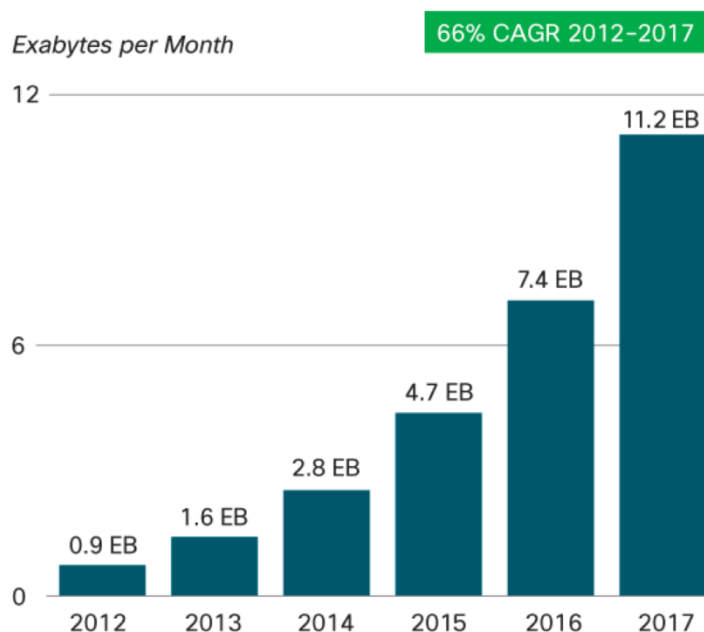
Source: Cisco VNI Mobile Forecast, 2013

Forecasted average traffic to be generated in 2017 will be 2 660 Mb for an average smartphone, 5 114 Mb for a 4G smartphone and 5 387 for a tablet. Even with a price cap reduction set for 1 July 2014 (valid until 2017) at EUR 0.20 per megabyte, the cost of roaming would, under this forecast, double for average smartphones and tablets and increase by almost 13% in the case of 4G smartphones.

Table 5: Costs of roaming - monthly estimate for 2017

Device	Average traffic generated monthly in 2017 - forecast	Cap price according to Roaming III Regulation
Average Smartphone	2 660 Mb	EUR 532
4G Smartphone	5 114 Mb	EUR 1 022.8
Tablet	5 387 Mb	EUR 1 077.4

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[112] Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2012–2017, p. 3, http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11520862.pdf.

Figure 7:   Exabytes per month

Figures in legend refer to traffic share in 2017.
Source: Cisco VNI Mobile Forecast, 2013
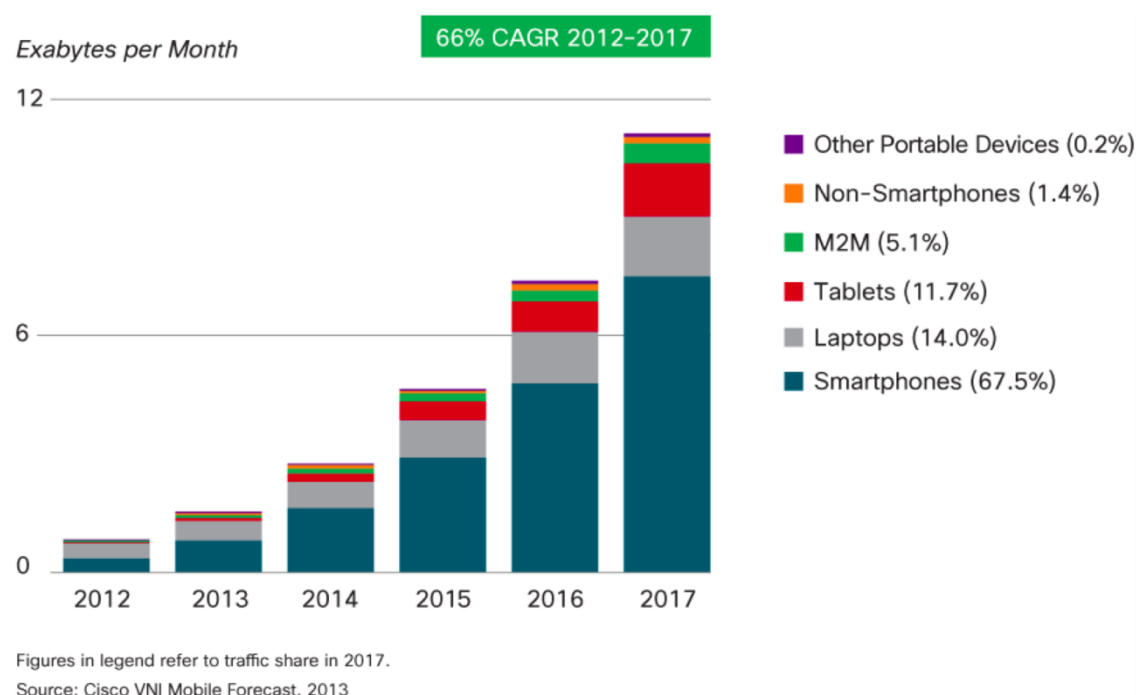
In the light of such global trends, **current partitioning of mobile data connectivity on the Digital Single Market could have important negative effects on access to information and content in Europe**.

Further developments, putting even more pressure on mobile connectivity, will involve new products generating and receiving content and information, such as connected cars and wearables (headsets and glasses, sensor-enabled wristwear, medical devices that transfer data and tech-enabled textiles).

Figure 8:   The Internet of Everything
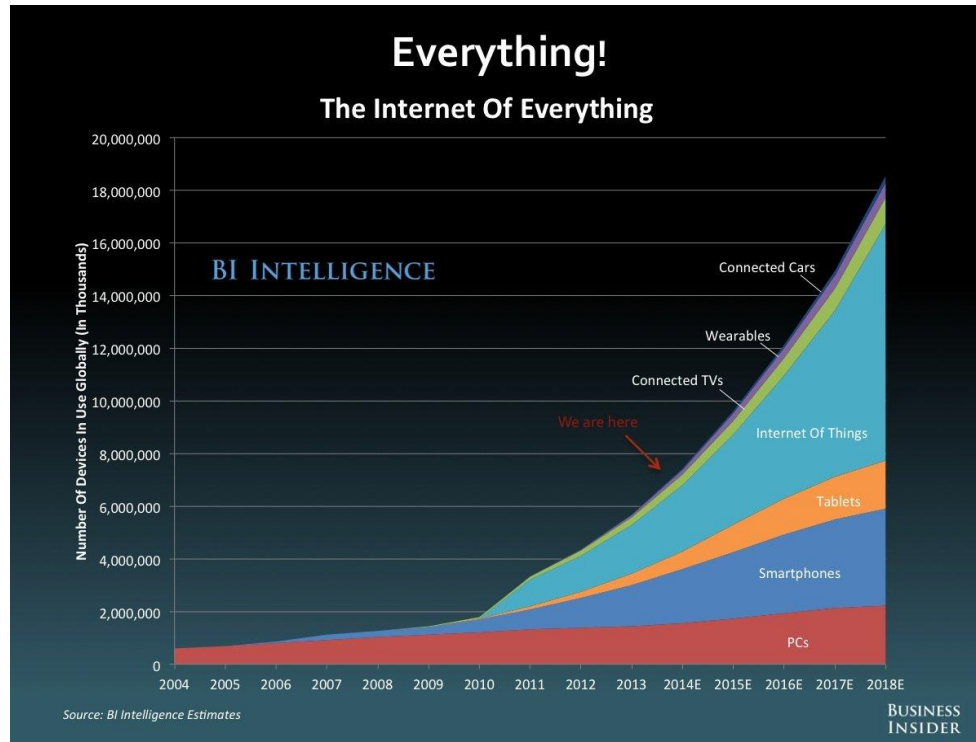
Source: Business Insider, available at: http://www.businessinsider.com/the-internet-of-everything[113]

While the issue of interstate roaming in the US has been resolved by the market itself, with operators voluntarily removing roaming charges, similar developments have not occurred in Europe[114]. The possibility of such a solution offered through consolidation triggered concerns by the European Commission, at exactly the moment when relevant technologies were about to emerge. In 2000, when considering a merger between Vodafone and Mannesmann, the European Commission found that "the merged entity via its integrated network will be able to provide advanced telecommunication services to all customers on a **seamless pan-European basis**, at least in those Member States where it was operating. The merged entity would have the possibility to provide the advanced services in at least those eight Member States where it has sole control. It is also likely that it will be able to provide these services in those three Member States where it has joint control, given that their partners in these joint ventures would have an incentive to modify their networks to allow them access to a large single seamless network which would benefit their own subscribers" [115]. Importantly, the decision concerned new services essentially offering pan-European mobile Internet services and wireless location services for mobile users. Products that could have developed from such services could include corporate local area network access, video services, mobile Internet access, mobile e-commerce and unified media conversion to subscribers[116]. The decision has identified a number of opportunities (mainly for European corporate clients) deriving from such services (e.g. accessing the company database while travelling, sending and receiving e-mails, using business information systems from a mobile terminal, emerging video services). In addition, these services

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[113] Danova T., *The Internet of Everything, available at:* http://www.businessinsider.com/the-internet-of-everything-2014-slide-deck-sai-2014-2?op=1.

[114] In most of the Member States, telecom operators sell modest data packages for travelling in Europe either as data volumes or as daily lump sums. These packages vary strongly among Member States. Recently T-Mobile introduced a roaming-free plan covering over 100 countries, announced as intended to disrupt the market

[115] Case No COMP/ M. 1795 Vodaphone Airtouch/Mannesmann, point 42, emphasis added.

[116] Idem, p 15.

would, to a substantial degree, be accessed through Internet and mobile portals, and allow users easy access to the desired data in an appropriate form. The decision identified the specific demand of corporate customers due to the international scope of their business with sites across Europe, and the need for such services to be provided seamlessly. In 2000, the possibility of such seamless roaming-free pan-European services was a cause of concern for the European Commission, as it assumed that other competitors would have difficulties in presenting similar seamless pan-European offers.

In 2012, a study prepared for the European Parliament's IMCO Committee clearly advocated a **'roam like a native' approach** as a tool to eliminate the issue of roaming in the case of mobile data, and clearly stressed the **importance of an LTE roll-out** to enable Europe's connectivity capabilities to be able to catch up with those of the US or South Korea[117]. However, the 2013 study for the Industry, Research and Energy (ITRE) Committee noted that "[i]ssues related to roaming and other cross-border communications … require further study and should be dealt with in an integrated way"[118].

The recent European Commission's proposal for a Regulation of the European Parliament and of the Council laying down measures concerning the European single market for electronic communications and to achieve a Connected Continent[119] aims to remedy the situation on both aspects. The proposal has, however, attracted criticism due to a combination of: legislative technique disrupting recently-introduced provisions of the Roaming III Regulation; significant complication of the existing regulatory framework; scarce time left to the legislator to consider the proposal; as well as uncertainty as to the market impact of proposed solutions for roaming, largely based on the legal incentive to enter into connectivity agreements. It seems that the Commission is trying to re-ignite a development that could have occurred on the market over a decade ago when the Vodaphone Airtouch/Mannesmann merger decision was taken, but this time with less concern that the reform could lead to consolidation of the European telecommunications market or drive smaller operators out of business. This indicates a need for a more coherent approach in policy making with better integration of policy objectives and synergies among different areas of intervention[120].

For the Digital Single Market to function properly, **mobile data connectivity should be homogenous irrespective of national borders on the territory of the European Union**. A legislative solution, which is neutral from a technological point of view, should introduce such a general requirement in order to prepare the EU for the exponential growth in mobile data transfer signalled in forecasts. From a European perspective, the most evident solution would be to eliminate data roaming altogether, since it constitutes a form of discrimination against customers from other Member States. This could still be insufficient, as even national mobile data transfers outside predefined data packages may still prove to be expensive.

Importantly, since streaming and online access to content involve significant amounts of Internet traffic, it is important to strike the right balance between, on the one side, treating

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[117] Marcus J.S., Nooren P., Philbeck I., *State of the Art Mobile Internet Connectivity and its Impact on e-Commerce*, Briefing note prepared for the European Parliament's Committee on Internal Market and Consumer Protection, 2012, p. 37.

[118] Marcus J.S. et al., *How to Build a Ubiquitous EU Digital Society*, Study prepared for the European Parliament's Committee on Industry, Research and Energy, 2013, p. 166.

[119] Proposal for a Regulation of the European Parliament and of the Council laying down measures concerning the European single market for electronic communications and to achieve a Connected Continent, and amending Directives 2002/20/EC, 2002/21/EC and 2002/22/EC and Regulations (EC) No 1211/2009 and (EU) No 531/2012.

[120] See: Muller P. et al., *Performance-based Full Policy Cycle for the Digital Single Market,* Study prepared for the European Parliament's Committee on Internal Market and Consumer Protection, 2013, p. 69.

Streaming and online access to content and services

Internet connectivity as another area of business activity, and, on the other side, as an information highway with significant societal and economic importance. In particular, **net neutrality** is a crucial element of this weighing exercise.

The exponential growth of the Internet into a ubiquitous Internet of Everything will also require stringent **cybersecurity** and **data protection policy** in order to safeguard the digital environment. [121] These areas are parts of broadly understood Internet governance, where the European Parliament has a special role to play in ensuring the international governance balance, thereby safeguarding the European role therein. [122]

While regulation of ubiquitous computing, and in particular streaming and online access to content and services encompasses such important areas as trade regulation and technological issues (e.g. interoperability or technological standards), **fundamental rights** embedded in European legal culture (e.g. **privacy**) need to be safeguarded against possible threats in this areas.

3.3.   Intellectual property rights and hypermedia payment systems

Intellectual property was conceived as a tool to **preserve authors' rights** (in Europe) or to **stimulate creativity and innovation** (in the US). It allows for, pecuniary or moral, recognition of innovation, and as such creates an incentive to share innovation and creativity. However, over time intellectual property rights have evolved as well as a business tool enabling price discrimination, market segmentation and tax avoidance.

The Digital Single Market experiences significant difficulties in providing for comprehensive EU-wide services with legal content, or for national services with content available EU-wide. The first market failure, **incapacity to provide comprehensive EU-wide services with legal content**, is currently awaiting legislative intervention aimed at setting up pan-European licencing schemes and unlocking access to orphan works[123]. The second market failure, **unavailability of national content for consumers from other Members States**, results from discriminatory business practices leading to market fragmentation.

Established legislation and the settled jurisprudence of the Court of Justice construed on the basis of Internal Market principles of the free movement of goods and services, the doctrine of exhaustion of intellectual property rights and provisions of competition law, systematically insist that companies cannot refuse sales to customers from other Member States, in a situation where a consumer takes the initiative to acquire a product in a shop located in another Member State (passive sales). These freedoms allow EU citizens to acquire goods carrying copyrights or trademarks, when visiting other Member States, without being discriminated or subject to refusal to sell based on nationality or residence.

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[121] Mobile tracking, becoming more sophisticated with development of wearable devices, will be increasingly complex and precise, covering such areas as consumption habits and lifestyle.

[122] European Parliament is already extensively involved in these issues working on legislative proposals for a regulation on the protection of individuals with regard to the processing of personal data and on the free movement of such data (General Data Protection Regulation) 2012/0011 (COD), a directive on the protection of individuals with regard to the processing of personal data by competent authorities for the purposes of prevention, investigation, detection or prosecution of criminal offences or the execution of criminal penalties, and the free movement of such data 2012/0010 (COD), a directive concerning measures to ensure a high common level of network and information security across the Union 2013/0027 (COD), as well as working on its own regulations, e.g. European Parliament's resolution of 12 March 2014 on the US NSA surveillance programme, surveillance bodies in various Member States and their impact on EU citizens' fundamental rights and on transatlantic cooperation in Justice and Home Affairs (2013/2188(INI)).

[123] The current licencing regulation makes it easier for European distributors to acquire licences for US movies than for content from other MSs. As a consequence, "in theatrical distribution the share of non-national EU films" was 8% in 2010. For Video-on-demand, this share varied from MS to MS, e.g. share of non-national EU films was 9% in Germany and 20% in Spain; see: KEA (October 2010), Multi-Territory Licensing of Audiovisual Works in the European Union, p. 5, http://www.keanet.eu/docs/mtl%20-%20full%20report%20en.pdf (accessed 5 July, 2012).

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Vertical agreements prohibiting such sales, as well as abusing dominant position, are contrary to Art. 101 (1) and 102 of the Treaty on the Functioning of the European Union (TFEU).

In the case of the Digital Single Market, and despite similar legal and economic frameworks[124], service providers select products for a particular Member State (access limited to a Member State's particular territory, selected repertoire, selected linguistic versions) and use technological tools (such as geo-localisation, geo-blocking, IP address, Digital Rights Management, and personal data and payment information) to refuse access to content designated for another national market. At best, consumers are re-routed to the same service in their home Member State with such consequences as different pricing, a more limited choice, variations in quantity and quality, or different payment options[125]. Considering the fact that **56% of consumers buy across borders, because they cannot source the product in their national market[126]**, these practices have a significant impact on European consumers, effectively depriving them of products they value and, indeed, of the benefits of the Single Market.

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[124] Article 56 TFEU requires the abolition of all restrictions on the freedom to provide services, even if those restrictions apply without distinction to national providers of services and to those from other Member States, when they are liable to prohibit, impede or render less advantageous the activities of a service provider established in another Member State where it lawfully provides similar services. Moreover, the freedom to provide services is for the benefit of both providers and recipients of services (see Case C-42/07 Liga Portuguesa de Futebol Profissional and Bwin International [2009] ECR I-7633, paragraph 51 and the case-law cited). In addition, art. 18 of the Treaty on the functioning of the European Union contains a general prohibition of direct discrimination on grounds of nationality carefully extended by the ECJ to discrimination on grounds of residence (as indirect discrimination on grounds of nationality) and in some areas to private entities. Further art. 20(2) of the Services Directive prohibits conditions of access to a service that discriminate on the basis of nationality or place of residence of service recipient, although allowing discrimination justified by objective criteria, which would be easier to identify in case of physical rather than digital trade. The ECJ has stated that intellectual property rights are not inviolable and are not subject to absolute protection but rather must be balanced against the protection of other fundamental rights, see judgement of 29.1.2008, Case C-275/06 Promusicae, ECR 2008 I-271, para 62-68. In Joined Cases C-403/08 and C-429/08, Football Association Premier League Ltd (C-403/08) and Karen Murphy (C-429/08) ECR 2011 I-09083 in para 93-107 the ECJ has stated that '[d]erogations from the principle of free movement can be allowed only to the extent to which they are justified for the purpose of safeguarding the rights which constitute the specific subject-matter of the intellectual property concerned (see, to this effect, Case C-115/02 Rioglass and Transremar [2003] ECR I-12705, paragraph 23 and the case-law cited). It is clear from settled case-law that the specific subject-matter of the intellectual property is intended in particular to ensure for the right holders concerned protection of the right to exploit commercially the marketing or the making available of the protected subject-matter, by the grant of licences in return for payment of remuneration (see, to this effect, Musik-Vertrieb membran and K-tel International, paragraph 12, and Joined Cases C-92/92 and C-326/92 Phil Collins and Others [1993] ECR I-5145, paragraph 20). However, the specific subject-matter of the intellectual property does not guarantee the right holders concerned the opportunity to demand the highest possible remuneration. Consistently with its specific subject-matter, they are ensured – as recital 10 in the preamble to the Copyright Directive and recital 5 in the preamble to the Related Rights Directive envisage – only appropriate remuneration for each use of the protected subject-matter. In order to be appropriate, such remuneration must be reasonable in relation to the economic value of the service provided. In particular, it must be reasonable in relation to the actual or potential number of persons who enjoy or wish to enjoy the service (see, by analogy, Case C-61/97 FDV [1998] ECR I-5171, paragraph 15, and Case C-52/07 Kanal 5 and TV 4 [2008] ECR I-9275, paragraphs 36 to 38).' However, while applicability of exhaustion doctrine including tangible and intangible goods has been clarified for computer software (see: Judgement 3.7.2012 Case 128/11 UsedSoft ECR, para 61, concerning computer software) the very clear legal framework for services is complicated in other areas of intellectual property by provisions of Copyright Directive awaiting further clarifications from the ECJ or a modification of the Directive.

[125] Schulte-Noelke H. et al., *Discrimination of Consumers on the Digital Single Market*, Study prepared for the European Parliament's Committee on Internal Market and Consumer Protection, 2013; expanding on data protection concerns triggered by DRM see: Roig Antoni, *Privacy-Preserving Digital Rights Management*, in in Bourcier Danièle and others (eds.), *Intelligent Multimedia. Managing Creative Works in a Digital World,* European Press Academic Publishing, 2010*,* p. 277- 288.

[126] *Consumer market study on the functioning of e-commerce and the Internet marketing and selling techniques in the retail of goods*, Final Report, Part 1: Synthesis Report, 2011, http://ec.europa.eu/consumers/consumer_ research/market_studies/docs/study_ecommerce_goods_en.pdf.

As a consequence: 1) **consumers' awareness of cultural content available in other Member States is significantly limited**; and 2) **citizens who moved to another Member State and would like to have full access to their home Member State's culture while living abroad have difficulties in getting such access on-line**, something that may discourage them from exercising their freedom of movement guaranteed under the Treaty. This is clearly a lost opportunity, as mass markets and services offering online access to content enable distributors to aggregate global niches/consumers who are thinly spread over Europe and even over the world[127].

While, for old media, business model based on market-partitioning and territorial restrictions was a logical strategy aimed at recovering significant distribution costs, such justification is not in place for ICT distribution channels that can guarantee fair remuneration through a variety of payment systems, while allowing for access to content and information on the entire territory of the EU. Therefore, there is no justification to exclude copyrighted content, which is distributed online, from the principles of free movement of goods and services.

The issue of fair remuneration recalls that copyright is perceived as a fuel for creativity and innovation, because it guarantees author's right to remuneration. Even if creativity would be induced intrinsically, creative acts deserve remuneration. However, transaction costs that built up around **old media business models** of physical distribution of goods and services carrying IPR - based on artificial restraining of access in order to maximise profits, thus creating a significant access barrier to content and information[128] - **do not correspond to opportunities that the Internet economy creates for sharing creativity**.

As discussed earlier, a new business model based on purely digital distribution (in particular subscription models) allows for ubiquitous access to content and information, with remuneration corresponding to the intensity with which the content was consulted.

This could lead to **hypermedia payment systems** - a concept according to which information/content would have value corresponding to the new collaborative economy, instead of being valued on the basis of old economy models or being free. Thus, authors could be paid micropayments each time content they have created is accessed[129] with such advantages as: 1) fairer remuneration; 2) improved access; 3) precise measurement of actual use of information and content, as well as interest in such information and content; 4) increased exchange, creativity and innovation; and 5) simplification of a myriad of current initiatives that are based on approximate lump-sum remunerations or exemptions, such as the private copy exemption[130].

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[127] Summer R, *Unleashing the benefits of new technologies in the audiovisual media industry*, p. 6, available at: http://www.ericsson.com/televisionary/blog/unleashing-benefits-new-technologies-audiovisual-media-industry.

[128] Suber P., *Open Access*, MIT Press, p. 5, http://www.amazon.com/Open-Access-Press-Essential-Knowledge/dp/0262517639/ref=sr_1_22?s=books&ie=UTF8&qid=1348216012&sr=1_22&keywords=access+to+information#reader_0262517639.

[129] Lanier J. *You are not a gadget*, Penguin Books Ltd. 2011, p. 101.

[130] Bitan H., *Droits des créations immatérielles: logiciels, bases de données, autres œuvres sur le WEB 2.0*, Wouters Kluwer France, 2010.

Hypermedia would be enabled by an **ICT accounting system** registering all occasions when information or content was consulted, and dispatching micropayments according to contractual arrangements between all persons involved in the creation of the content; including those whose content was cited or mashed up in the consulted content. Such a system could be financed through **a voluntary additional 'content' fee** corresponding to the volume of Internet traffic consumed, in addition to ISP provider charges for Internet connectivity.

However, streaming creates its own piracy problems[131] or issues of undeserving content that would need to be resolved before the introduction of such systems.

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[131] Yeh B.T., *Illegal Internet Streaming of Copyrighted Content: Legislation in the 112th Congress*, http://www.amazon.com/Illegal_Internet_Streaming_Copyrighted_ebook/dp/B005S1W9ZU/ref=sr_1_3?s=digital -text&ie=UTF8&qid=1343375927&sr=1-3&keywords=streaming#reader_B005S1W9ZU, although the hypermedia system could eliminate main concerns in this area potentially turning pirate sites into access sites. Elevated piracy rates call for measures that could limit it, see Garcia J. et al. *Gutemberg 2.0. La revolucion de los libros eletronicos,* Ediciones Trea 2011, p. 131.

4. CONCLUSIONS AND RECOMMENDATIONS - A MODEL FOR EUROPE

Europe is lagging behind its main international competitors in the area of streaming and commercial online access to content and information. A substantial effort needs to be made in this field, since global trends indicate that streaming and access to online content will become the most important segment of Internet use. At the same time, Europe has a clear advantage in the area of e-governance and rich cultural resources that could be made available online.

European values are embedded in the main benefits of streaming and online access to content and services:

- **improved access to information and content**,
- **broadened access to cultural diversity**,
- **efficiency and reduced environmental footprint through dematerialisation of consumption**.

In addition, streaming and online access lead to the development of **new economic and business models** of collaborative society.

The following recommendations could enforce European potential in the area of streaming and online access to content and services:

1. The EU's fixed and mobile data connectivity needs to be on a par with that of its competitors; in particular, Europe needs **clear mobile data connectivity objectives**, emphasis placed on LTE roll-out and roaming-free services, and a clear vision on next generation 5G mobile data services.

2. **The principles of free movement of goods and services need to apply fully in the area of online content**; currently the Digital Single Market is partitioned along national borders due to a lack of pan-European services and a refusal of passive sales by online distributors of digital content. This is not only detrimental to e-commerce, but also to the free movement of persons as it deprives Europeans who have moved to another Member State of access to the cultural resources of their Member State of origin. Public authorities should address cases of refusal to sell or refusal to supply services, in particular where they are practiced by monopolistic suppliers.

3. While Europe is clearly lagging behind the US in terms of commercial offer and big platforms (such as Google, Facebook, Netflix), it has important **potential in terms of ubiquitous government**; some Member States, e.g. Estonia, are world leaders in this area. In order to fully exploit this potential Europe needs a coordinated action rather than fragmented efforts in each of the Member States. The most obvious areas for action in this respect are e-Health, electronic product information, e-compliance (including e-tax and e-customs), online access to European cultural resources, and online dispute resolution.

4. Ubiquitous services in the field of streaming and online access to content is an area where the focus of the Internal Market should be changed from removing internal barriers to showing **how the European dimension can be used to the benefit of European citizens**, requiring a more flexible understanding of **the subsidiarity test**.

5. Considering the number of issues affecting the proper functioning of the Digital Single Market there is a clear need for a **Single Market Act III focused on digital issues.**

6. Europe could consider **promoting hypermedia based payment systems** to remunerate authors and content providers on the basis of how often their content is consulted; this step could simplify a myriad of current initiatives that are based on approximate lump-sum remunerations or exemptions.

7. Europe needs to **attract cloud computing infrastructure** in order to enforce its Internet governance autonomy and better protect its businesses and citizens.

8. The exponential growth of the Internet into a ubiquitous Internet of Everything will also require comprehensive **net neutrality**, **cybersecurity** and **data protection** policies, in order to build up consumers' trust and safeguard the digital environment. These areas are parts of broadly-understood Internet governance, where the European Parliament has a special role to play in restoring the international governance balance, thereby safeguarding the European role therein.

9. While regulation of ubiquitous computing, and in particular streaming and online access to content and services, encompasses such important areas as trade regulation and technological issues (e.g. interoperability), the European Parliament needs to safeguard **fundamental rights** embedded in European legal culture that could be affected in this areas (e.g. **privacy**).

REFERENCES

- The American Assembly, Columbia University (November 2011). *Copyright Infringement and Enforcement in the US*. http://piracy.ssrc.org/wp-content/uploads/2011/11/AA-Research Note Infringement and Enforcement-November-2011.pdf.

- Bitan H., Droits des créations immatérielles: logiciels, bases de données, autres oeuvres sur le WEB 2.0, Wouters Kluwer France, 2010.

- Chandra R., *Information Technology in 21st Century, Universal Access to Information Resources*, Kalpa Publications, 2003, http://books.google.co.uk/books?id=f-721uFgFcwC&pg=PA2&dq=access+to+information+as+economic+concept&hl=en&sa=X&ei=UQaqULHiLcyShgfQuYGoAQ&ved=0CDcQ6AEwAA#v=onepage&q=access%20to%20information%20as%20economic%20concept&f=false.

- Cisco, *Unified Consumer Voice Portal: Building Unified Contact Centers*, Cisco Press, 2012. http://books.google.co.uk/books?id=NvsqLlbSAbQC&pg=PT310&dq=streaming+definition&hl=en&sa=X&ei=ZZgFUN_YDMTBhAf16K3TBw&ved=0CGUQ6wEwBjge#v=onepage&q=streaming%20definition&f=false.

- Cisco, *Visual Networking Index: Global Mobile Data Traffic Forecast Update*, *2012–2017*, http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-520862.pdf.

- Cisco, *Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2013–2018*, http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-520862.html.

- *Computing in the Cloud*, European Institute of Innovation and Technology, 2012 http://eit.ictlabs.eu/uploads/media/CloudComputing_print_0711_01.pdf.

- *Connecting everything: A conversation with Cisco's Padmasree Warrior*, http://www.mckinsey.com/insights/high_tech_telecoms_internet/connecting_everything_a_conversation_with_ciscos_padmasree_warrior.

- Costello S. (2012), *What is Streaming?*: http://ipod.about.com/od/glossary/g/streaming_def.htm.

- Danova T., *The Internet of Everything*, available at: http://www.businessinsider.com/the-internet-of-everything-2014-slide-deck-sai-2014-2?op=1.

- *Data, data everywhere*, Economist: Special report of 2/8/2012, http://www.economist.com/node/15557443.

- Duke Ch. et al., *European Single Point of Contact,* Study prepared for the European Parliament's Committee on Internal Market and Consumer Protection, 2013.

- Duncan G. (17 November 2011). *200+ labels withdraw their music from Spotify: are its fortunes unravelling?* http://www.wired.co.uk/news/archive/2011-11/17/labels-withdrawing-from-spotify.

- Diehl E., *Securing Digital Video, Techniques for DRM and Content Protection*, Springer, 2012, http://books.google.co.uk/books?id=J_liBj22RokC&printsec=frontcover&dq=Digital+rights+management&hl=en&sa=X&ei=1naaUPXPOcfBhAe6l4CADQ&ved=0CEkQ6AEwBThG.

- European Commission (May 2009). *Final Report on the Content Online Platform*, *available at*: http://ec.europa.eu/avpolicy/docs/other_actions/col_platform_report.pdf.

- European Commission, *Consumer market study on the functioning of e-commerce and the Internet marketing and selling techniques in the retail of goods*, Final Report, Part 1: Synthesis Report, 2011, http://ec.europa.eu/consumers/consumer_research/market_studies/docs/study_ecommerce_goods_en.pdf.

- Fiedler A. et al., *Cloud computing*, Study prepared for the European Parliament's Committee on Internal Market and Consumer Protection, 2012, http://www.europarl.europa.eu/committees/en/studiesdownload.html?languageDocument=EN&file=73411.

- Follansbee J., *Get streaming!*, Elsenvier Inc., 2004, p. xvi, http://books.google.co.uk/books?id=pYlE8HapG4AC&printsec=frontcover&dq=streaming&hl=en&sa=X&ei=4Jw_UJObKcmChQfhvP3mBw&ved=0CEMQ6wEwAQ#v=onepage&q=streaming&f=false.

- Furth B., *Encyclopedia of Multimedia*, Springer 2008:http://books.google.co.uk/books?id=Ipk5x-c_xNIC&pg=PA282&dq=streaming+definition&hl=en&sa=X&ei=zZEFUK7oAYTT0QXuzd21Bw&ved=0CEkQ6wEwAg#v=onepage&q=streaming%20definition&f=false.

- Garcia J. et al., *Gutemberg 2.0. La revolucion de los libros eletronicos, Ediciones Trea* 2011.

- Halme K. et al., *The Role of Knowledge and Innovation Communities in the EU Research and Innovation*, Briefing note prepared for European Parliament's Committee on Industry, Research and Energy, 2012, http://www.europarl.europa.eu/committees/en/studiesdownload.html?languageDocument=EN&file=74251.

- Helberger N., *Controlling Access to Content: Regulating Conditional Access in Digital Broadcasting*, Kluwer Law International, 2005, http://books.google.co.uk/books?id=FqOe3r9l17gC&printsec=frontcover&dq=online+access+to+content&hl=en&sa=X&ei=K5IGUNOZO8TYtAaUsa2GBw&ved=0CEIQ6AEwAQ#v=onepage&q=online%20access%20to%20content&f=false.

- IFPI (2012). *Digital Music Report. Expanding Choice. Going Global*, available at: http://www.ifpi.org/content/library/DMR2012.pdf.

- James J., *How Much Data is Created Every Minute?*, available at: http://www.domo.com/blog/2012/06/how-much-data-is-created-every-minute/?dkw=socf3

- KEA (October 2010), *Multi-Territory Licensing of Audiovisual Works in the European Union*, http://www.keanet.eu/docs/mtl%20-%20full%20report%20en.pdf (accessed 5 July, 2012).

- Kern, Ph., *The Impact of Digital Distribution – A Contribution,* KEA European Affairs, 2009, http://www.keanet.eu/docs/impactondigitaldistribution.pdf.

- Lanier J., *You are not a gadget*, Penguin Books Ltd. 2011.

- Lessing L., *How Big Media Uses Technology and the Law to Lock Down Culture and Control Creativity*, The Penguin Press, 2004, http://books.google.co.uk/books?id=cxZp0sV3V80C&pg=PA298&dq=online+access+to+content&hl=en&sa=X&ei=Qg4IULmcGYfChAf2-p3GAw&ved=0CEQQ6AEwAjgy#v=onepage&q&f=false.

- Little A.D*., LTE Network and Spectrum Strategies, Strategic Options for Mobile Operators in 4G Mobile Networks*, 2012, http://www.adlittle.com/downloads/tx_adlreports/ADL_LTE_Spectrum_Network_Strategies.pdf.

- Marcus J.S., Nooren P., Philbeck I., *State of the Art Mobile Internet Connectivity and its Impact on e-Commerce*, Briefing note prepared for the European Parliament's Committee on Internal Market and Consumer Protection, 2012.

- Marcus J.S. et al., *How to Build a Ubiquitous EU Digital Society*, Study prepared for the European Parliament's Committee on Industry, Research and Energy, 2013.

- McKenzie, P., Burlkell, J., Trosow, S., Wong, L., Whippey, C. & McNally, M. (2012): *User-generated online content 1: overview, current state and context*. First Monday, Volume 17, Number 6-4 June 2012, http://firstmonday.org/htbin/cgiwrap/bin/ojs/index.php/fm/article/view/3912/3266.

- Miller Paul (26 January, 2012). *Debate rage as Spotify, MOG and Radio kill / save the music industry*. http://www.theverge.com/2012/1/26/2740981/debate-spotify-mog-rdio-kill-save-music-industry.

- McKinsey Global Institute, *Disruptive technologies: Advances that will transform life, business, and the global economy*, http://www.mckinsey.com/insights/business_technology/disruptive_technologies.

- Mogensen Lisabeth, Hermansen John E., Halberg Niels, Dalgaard Randi, *Life Cycle Assessment across the Food Supply Chain*, in Cheryl J. Baldwin (ed.), *Sustainability in the Food Industry*, Wiley-Blackwell 2009, http://orgprints.org/15610/1/15610.pdf.

- Muller P. et al., *Performance-based Full Policy Cycle for the Digital Single Market*, Study prepared for the European Parliament's Committee on Internal Market and Consumer Protection, 2013.

- Nielsen Michael, speech at: http://www.ted.com/talks/lang/en/michael_nielsen_open_science_now.html. For open source and open information, see Ushahidi's web site: http://www.ushahidi.com/.

- Ozer J., What is streaming? A high-level view of streaming media technology, history, and the online video market landscape, http://www.streamingmedia.com/Articles/ReadArticle.aspx?ArticleID=74052.

- Rayburn D., *Streaming and Digital Media: Understanding the Business and Technology*, Elsevier Inc., 2007, p. 24 http://www.amazon.co.uk/Streaming-Digital-Media-UnderstandingTechnology/dp/0240809572/ref=sr_1_15?s=books&ie=UTF8&qid=1343050638&sr=1-15\l "reader_0240809572".

- Rifkin, Jeremy, *The Age of Access*, Jeremy P. Tarcher/Putnam, 2001.

- Rifkin, Jeremy, *The Third Industrial Revolution*, Palgrave Macmillian, 2011, p. 214.

- Roig Antoni, *Privacy-Preserving Digital Rights Management*, in in Bourcier Danièle and others (eds.), *Intelligent Multimedia. Managing Creative Works in a Digital World*, European Press Academic Publishing, 2010, p. 277- 288.

- Sandvine (2011). *Global Internet Phenomena Spotlight. Europe, Fixed Access*, Spring 2011, http://www.scribd.com/doc/55777280/Sandvine-Internet-Phenomena-Report-Spring-2011.

- Sandvine (2012). *Global Internet Phenomena Spotlight: Europe, Fixed Access*.

- Sandvine (2012). *Global Internet Phenomena Spotlight: North America, Fixed Access*.

- Schulte-Noelke H. et al., *Discrimination of Consumers on the Digital Single Market*. Study prepared for European Parliament's Committee on Internal Market and Consumer Protection, 2013.

- Schippl J., Weinberger N., *Assessing the potential of ICT to increase energy efficiency and fight climate change – key technologies and prospects,* Study for Science and Technology Options Assessment, European Parliament 2008.

- Shirky C., speech on *How cognitive surplus will change the world*, http://www.ted.com/talks/clay_shirky_how_cognitive_surplus_will_change_the_world.html (25/7/2012).

- Suber P., *Open Access*, MIT Press, 2012, http://www.amazon.com/Open-Access-Press-Essential-Knowledge/dp/0262517639/ref=sr_1_22?s=books&ie=UTF8&qid=1348216012&sr=1-22&keywords=access+to+information#reader_0262517639.

- Summer R, *Unleashing the benefits of new technologies in the audiovisual media industry*, available at: http://www.ericsson.com/televisionary/blog/unleashing-benefits-new-technologies-audiovisual-media-industry/.

- Tschmuck, P., *'is streaming the next big thing? an international market analysis'*, http://musicbusinessresearch.worldpress.com/2013//06/04/is-streaming-the-next-big-thing-an-international-market-analysis/.

- Transformative Consumer Technologies: Natural Computing.; http://www.microsoft.eu/innovation-in_society/events/transformative_consumer_technologies_natural-computing.aspx.

- Yeh B.T., *Illegal Internet Streaming of Copyrighted Content: Legislation in the 112th Congress*, http://www.amazon.com/Illegal_Internet_Streaming_Copyrighted_ebook/dp/B005S1W9ZU/ref=sr_1_3?s=digital-text&ie=UTF8&qid=1343375927&sr=1-3&keywords=streaming#reader_B005S1W9ZU.

- Zittrain J.L., *The Future of Internet and how to Stop It*, Yale University Press, 2008, http://books.google.co.uk/books?id=NiATs_C6nlQC&pg=PA23&dq=online+access+to+content&hl=en&sa=X&ei=lwMIUIf2C4OnhAfo4PDOAw&ved=0CHEQ6AEwCTgU#v=onepage&q=online%20access%20to%20content&f=false.

- Ce Zhu, Yuenan Li & Xiamu Niu, *Streaming Media, Architectures, Techniques, and Applications*, IGI Global 2011, p. XV.

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