

**Money flows in the Internet ecosystem: Strategic opportunities for telecom operators and other Internet agents in the digital age**

by

**Israel Valentin Vinagrero**

M.S. Enterprise Telecommunication Management (2010)  
Universidad Politecnica de Madrid, Spain

B.S./M.S. Telecommunications Engineering (2005)  
Universidad de Valladolid, Spain

Submitted to the System Design and Management Program in Partial Fulfillment of the Requirements for the Degree of

**Master of Science in Engineering and Management**

at the

Massachusetts Institute of Technology

January 2014

© 2014 Israel Valentin Vinagrero  
All rights reserved

The author hereby grants to MIT permission to reproduce and to distribute publicly paper and electronic copies of this thesis document in whole or in part in any medium now known or hereafter created.

Signature of Author

Israel Valentin Vinagrero  
System Design and Management Program  
January 2014

Certified by

David D. Clark  
Thesis Supervisor  
Senior Research Scientist, MIT Computer Science and Artificial Intelligence Laboratory

Accepted by

Patrick Hale,  
Director, System Design and Management Program



# **Money flows in the Internet ecosystem: Strategic opportunities for telecom operators and other Internet agents in the digital age**

by

Israel Valentin Vinagrero

Submitted to the System Design and Management Program in Partial Fulfillment of the Requirements for the Degree of Master of Science in Engineering and Management at the Massachusetts Institute of Technology

January 2014

## **Abstract**

The question about where the money goes is something really interesting for all the companies in the Internet ecosystem. While there is a huge interest, no clear answers have been provided, partially because the ecosystem keeps changing. This thesis aims to answer this question by looking at how consumers spend their money in the different parts and services associated to the Internet. Besides looking at the money that consumers spend, this research also looks at the money that is in the ecosystem in things such as online advertising, which has been seen as one of the sources of revenues for many companies.

Three countries have been evaluated in this thesis, to show the situation in different parts of the world. US, UK and Spain have been the chosen countries and the comparison of the results gives a very good idea of the situation in Europe and US. A quantitative analysis has been done including six main categories: wireless, wireline voice, wireline video, wireline broadband access, ecommerce and online advertising. The results show big differences in expenditures among three different countries and analyze the potential reasons.

Finally, the research also aims to identify new business opportunities for telecomm operators associated to the different categories identified in the quantitative analysis. Given the current status of the Internet ecosystem, most of the business opportunities imply the creation of partnerships with Internet companies, so these recommendations could be also applicable to Internet companies.

Thesis Supervisor: David. D. Clark

Title: Senior Research Scientist

MIT Computer Science and Artificial Intelligence Laboratory



# Acknowledgements

My time at MIT has been an amazing, fantastic, enriching and unrepeatable experience that would have not been possible without the support of friends and family. This experience has really made me grow and has opened me a wide range of new possibilities. I have really enjoyed my time at MIT and I am very grateful to all those who have helped me throughout this way.

First, I would like to thank my advisor, David D. Clark, for all his invaluable guidance and help throughout this research. Each one of the meetings with him was a huge source of inspiration, and his insights were always really helpful. The combination of flexibility and high expectations has really helped me to grow. Thank you David, it has been a pleasure to work with you in this thesis and I have learned a tremendous amount from you during my time at MIT.

I would also like to thank my parents and brothers for their unconditional support, and to Maria, for always believing in me even more than what I do and for encouraging me to pursue my dreams. Also I would like to thank my maternal grandma Maria for always encouraging me to pursue new experiences.

Finally, I would like to thank my SDM friends. Thanks to the SDM study group, and especially thanks to Deepak, Pum and Oli (and his family) for this time at MIT. Classes, homeworks and my time at MIT would have not been the same without you. I can definitely say that one of the most important things I will have after MIT is a group of very good friends.



# Table of Contents

- ABSTRACT ..... 3**
- ACKNOWLEDGEMENTS..... 5**
- ACRONYMS ..... 12**
- CHAPTER 1 – INTRODUCTION ..... 13**
  - 1. INTRODUCTION ..... 13
  - 2. STATE OF THE ART ..... 14
  - 3. STAKEHOLDERS IN THE INTERNET ECOSYSTEM ..... 16
  - 4. RESEARCH APPROACH ..... 19
  - 5. THESIS ORGANIZATION ..... 20
- CHAPTER 2 – CONSUMER EXPENDITURES ..... 21**
  - 1. GLOBAL NUMBERS..... 21
    - 1.1. *Internet and Social Networks* ..... 21
    - 1.2. *Media companies* ..... 24
    - 1.3. *First conclusions*..... 26
  - 2. CONSUMER EXPENDITURES IN US ..... 27
    - 2.1. *Direct Expenditures*..... 27
      - 2.1.1. Wireline Services..... 27
        - 2.1.1.1. TV and Video Services..... 29
        - 2.1.1.2. Broadband access and Voice ..... 32
      - 2.1.2. Wireless Services..... 33
      - 2.1.3. Ecommerce ..... 35
        - 2.1.3.1. Digital content and Subscription to digital services ..... 37
    - 2.2. *Indirect Expenditures* ..... 40
      - 2.2.1. Online Advertising..... 40
      - 2.2.2. CDN ..... 42

2.3. <i>Analysis</i> .....	42
3. CONSUMER EXPENDITURES IN EU .....	45
3.1. <i>Spain</i> .....	45
3.2. <i>UK</i> .....	47
4. COMPARISON OF RESULTS .....	49
<b>CHAPTER 3 – ANALYSIS .....</b>	<b>50</b>
1. WIRELESS SERVICES .....	50
2. WIRELINE SERVICES: VOICE AND BROADBAND .....	52
3. WIRELINE SERVICES: VIDEO.....	54
4. ONLINE ADVERTISING .....	55
5. ECOMMERCE .....	61
<b>CHAPTER 4 – BUSINESS OPPORTUNITIES .....</b>	<b>64</b>
1. INTRODUCTION .....	64
2. METHODOLOGY .....	64
3. BUSINESS OPPORTUNITIES TO INCREASE REVENUES FROM B2C .....	66
3.1. <i>Ecommerce</i> .....	66
3.2. <i>Video</i> .....	69
3.3. <i>Online Advertising</i> .....	70
3.4. <i>Broadband access</i> .....	72
<b>CHAPTER 5 – CONCLUSIONS.....</b>	<b>74</b>
<b>CHAPTER 6 – FUTURE WORK.....</b>	<b>76</b>
<b>APPENDIX A –INTERVIEWS .....</b>	<b>77</b>
1. STRUCTURE OF THE INTERVIEWS .....	77
2. SUMMARY OF THE INTERVIEWS. ....	78



# List of Figures

Figure 1. Annual ARPUs for Internet companies, year 2012 .....	21
Figure 2. Total Facebook annual ARPU comparison, year 2012.....	22
Figure 3. Facebook ARPU breakdown comparison, year 2012.....	23
Figure 4. AOL ARPU for the total number of customers and only for paying subscribers and revenue breakdown, year 2012 .....	23
Figure 5. Media revenues, year 2012 .....	24
Figure 6. Netflix ARPU comparison, year 2012.....	25
Figure 7. iTunes revenue mix/account vs iTunes accounts .....	25
Figure 8. Wireline Retail Revenues main telcos and cable companies .....	28
Figure 9. Total money spent in TV and video services .....	32
Figure 10. Wireless Service Retail Revenues main telcos and cable companies.....	34
Figure 11. US Retail Ecommerce Sales.....	36
Figure 12. US Retail Mcommerce Sales .....	36
Figure 13 US Retail Ecommerce sales by category .....	37
Figure 14. Online Advertising revenues US, 2012 .....	41
Figure 15. Expenditures comparison for US households.....	43
Figure 16. Consumer Expenditures in Spain .....	46
Figure 17. Consumer Expenditures in Spain .....	48
Figure 18. Mobile Average Connection Speeds 2012 and projected .....	52
Figure 19. LTE Connections 2011-2013 and projected.....	52
Figure 20. Average connection speed per country.....	53
Figure 21. Monthly advertising per Broadband Household 2012, different EU countries and US .....	55
Figure 22. Online advertising expenditures per broadband household and per GDP, 2012. ....	57
Figure 23. Online advertising per GDP, total household income and total household expenditures, year 2012, several countries.....	58
Figure 24. Monthly online advertising evolution for US, UK and Spain .....	60

Figure 25. Advertising and ecommerce expenditures per household and per country..... 62

Figure 26. Retail Revenues telecomm operators US, year 2012. .... 65

Figure 27. Share of social commerce Sales..... 68

Figure 28. Facebook’s revenue on a quarterly basis ..... 72

## List of Tables

Table 1. Stakeholder’s needs and goals.....	18
Table 2. Total wireline retail revenues .....	28
Table 3. Video revenues for telcos and cable companies .....	30
Table 4. Video revenues for TV satellite providers.....	31
Table 5 Video revenues OTT video providers .....	31
Table 6. Total Wireless Service retail revenues .....	34
Table 7. Revenues for Content and Subscription services providers, year 2012.....	38
Table 8. Broadband household expenditures comparison.....	49
Table 9. Average mobile data .....	51
Table 10. Average fixed and mobile data .....	51

# Acronyms

B2B: Business to Business

B2C: Business to Consumer

FCC: Federal Communications Commission

GDP: Gross Domestic Product

MPLS: Multiprotocol Label Switching

M2M: Machine to Machine

VPN: Virtual Private Network

# Chapter 1 – Introduction

## 1. Introduction

The Internet has changed a lot in the last 30 years. In fact, it has been changing since the initial developments, back in the mid 70's. New users, new interfaces, new applications, and new players have been constantly emerging. One of the main differences between the current and the original Internet is that while the boundaries of the Internet in the 70's were defined by the technology, now and in the future they will be conditioned by the social and economic factors embedded in the network.

The current Internet is used for a wide range of purposes and it is focused on meeting the consumer's needs. Therefore, it is important to know what users value. They associate value with the applications they use. Facebook, twitter, Netflix are examples of the most popular applications now. More generally, consumers are valuing characteristics such as availability, performance, ease of use or trustworthy character.

According to this perception of value, the Internet is evolving fast. The new Internet is mobile; users watch videos, participate in social networks and buy different types of physical and digital products and services among other activities.

This fast-changing characteristic makes the Internet a very good example of a very complex sociotechnical system. There are many stakeholders interested in the development of the future Internet, and each one has different needs and goals. These differences in goals raise a lot of questions around future developments. Which stakeholders are the most important ones? Are the users the main beneficiaries? Which needs should be prioritized? Is security something essential? Who will have control of the changes? Should we assume that the future is something random? How much influence should governments have? Is the Internet current economic model sustainable? Are all the players in the Internet value chain going to put enough money in the right investments? What is the Internet for? These are only some examples of the

questions that companies, governments and consumers are asking. However, not all of them will be addressed by this thesis.

As mentioned before, the answers to these questions will be defined by social and economic factors. This thesis is focused on analyzing some of the economic factors, since the stakeholders involved in the development of the Internet are very interested in the economic opportunities. The problem is that in some cases there is no clear information about how much money is in the system.

The goal of the thesis is to provide a global picture of the money flows in the Internet ecosystem to understand what is really going on. The thesis is focused only on the money that consumers spend on the Internet. Looking at the numbers gives a very good idea of the real situations and provides insights with respect to some of the previous questions. Finally, the thesis will also define some new business opportunities related to the findings and focusing on telecomm operators.

## **2. State of the art**

From an ISP (Internet Service Provider) point of view, the question about how the different sources of revenues are evolving is something really interesting and important. In the last years, they have seen how some of their most successful revenue sources have lost a significant portion of the market share because of the emergence of new players. A couple of very popular examples are the voice<sup>1</sup> and the SMS (Short Message Service)<sup>2</sup> services, which a few years ago were ones of the main drivers of revenues for ISPs and now are being replaced by applications such as Skype or WhatsApp.

In addition, provisioning of Internet is cheap but not free and today the consumer pays essentially all the costs of the access provider. One of the questions this thesis will ask is how

---

<sup>1</sup> <http://stakeholders.ofcom.org.uk/market-data-research/market-data/communications-market-reports/cmr12/telecoms-networks/uk-5.23>, Last visited January 20<sup>th</sup>, 2014.

<sup>2</sup> [http://ovum.com/press\\_releases/ovum-estimates-that-operators-lost-13-9bn-in-2011-due-to-social-messaging/](http://ovum.com/press_releases/ovum-estimates-that-operators-lost-13-9bn-in-2011-due-to-social-messaging/), Last visited January 20<sup>th</sup>, 2014.

the users are spending their money, so that it is clear which portion of the revenues is going to each player. ISPs in particular are very worried about this issue, because some of them believe a different investment model should be adopted. Nowadays, they have to make huge capital expenditures to create the networks, to maintain them and to increase the capacity. Over-The-Top (OTT) content providers offer services over the Internet, and hence use the networks to be reached by the users, without usually paying for the investments.

For the purpose of this thesis, OTT content providers are defined as content providers on top of the existing infrastructure. They use the Internet to deliver their content, and they use the access networks of ISPs to be reached by the users. Some popular examples are Skype (voice and video), Youtube (video), Netflix (video), Hulu (video) and WhatsApp (instant messaging).

As mentioned before, the popularity of OTT applications has grown a lot over the last few years, which has led to a large number of tensions with ISPs which offer similar services. ISPs are facing challenges related to third-party companies that offer OTT services which can compete with their current offers. One good example could be Netflix and a cable operator. Consumers have to pay the cable company for the Internet access, but then they may get rid of the TV package in favor of the cheaper video service over the Internet.

This conflict could potentially lead to a decrease of the investments on the public Internet, and to an increase in the investments in new private IP platforms over which telecom and cable operators could offer better quality services and could not have OTT competitors<sup>3</sup>. This is a simplified version of the problem though, and it is related to the Internet sustainability.

For all these reasons, it is very useful to have a clear idea of the how money flows in the Internet ecosystem. In particular, it is very important to see how consumers are spending their money because revenues from retail market constitute a source of revenues bigger than revenues from B2B. And to have a clear idea of the differences between different parts of the

---

<sup>3</sup> Clark, D, and kc Claffy. "Platform models for Sustainable Internet Regulation", 2013

world, this thesis will make a comparison between the US and Europe. Since Europe has many different countries with very different situations, two examples will be considered: UK and Spain, as two very different cases inside Europe. Some parameters for the whole Europe will also be considered.

### 3. Stakeholders in the Internet Ecosystem

In order to understand the dynamics of the current Internet ecosystem, a brief description of each class of stakeholders will be given. Only stakeholders directly involved in the development of the Internet will be considered, and governments and consumers will be excluded. Note that the description of each one of the stakeholders will be simplified and very global, since each company is different and in some cases they act very differently in different markets.

In the current Internet, there are five main players:

- **Telecomm Operators:** also called carriers or telcos. They provide Internet access to the users as well as other services (wireline and wireless) using their infrastructures. There are wireless carriers, wireline carriers and carriers with both wireless and wireline services. They own the network and sometimes they license its use to third-parties or Virtual Network Operators.

Some examples of Network Operators are AT&T and Verizon (USA), Telefonica and Vodafone (Spain), British Telecom (UK).

- **Cable operators:** they provide Internet access and other services using their cable infrastructure. They use their wireline infrastructure, so they are only in the wireline business. The primary difference with telecomm operators is that cable operators usually do not have wireless infrastructure. They may offer also wireless services after commercial agreements with any of the wireless telecomm operators.



Some examples of Cable operators are Comcast (USA), Virgin (UK) or ONO (Spain).

- **OTT content providers:** they provide content and services over the Internet infrastructure. They use the infrastructures that network and cable operators own to provide users with innovative content and services.

As explained before, some examples of OTT content providers are Netflix and Hulu (video), Pandora and Spotify (music), WhatsApp and Line (instant messaging) or Skype (voice).

- **Content Delivery Networks (CDN):** they serve content to end-users using the Internet infrastructures. They usually get paid by content providers to deliver their content and in turn they sometimes pay ISPs for using their infrastructures. CDNs use different nodes deployed in multiple locations to reduce bandwidth costs and improve load times and availability of content.

Some examples of CDNs are Akamai and Limelight (USA). Other players that were well established in close businesses have deployed CDNs in the last years. Some examples are telcos (Telefonica in Spain and British Telecom in UK) and Amazon. Some other players also play multiple roles. Some examples are Youtube and Netflix, which are OTT content providers and also own their own CDN.

- **Advertisers:** they pay Internet websites and companies to advertise their content. Advertisers are usually connected to websites and applications that want to host advertisement through advertising networks.

Many websites, applications and OTT content providers in the Internet have been popular because they offer a free service to the user and their source of revenue is

based on advertising. One very popular example of this type of business model is Google.

To finish the introduction to the main stakeholders, a summary of the main needs and goals of each class is given in the Table 1.

<b>Stakeholder</b>	<b>Goals</b>	<b>Needs</b>
Telecomm Operator (telco)	<ul style="list-style-type: none"> <li>• Provide users with voice service (wireline and wireless)</li> <li>• Provide users with TV service (wireline)</li> <li>• Provide users with High Bandwidth Internet Access (wireline and wireless)</li> <li>• Provide users with services over the IP infrastructure.</li> </ul>	<ul style="list-style-type: none"> <li>• Improve ROI for CAPEX</li> <li>• Increase sources of revenues</li> <li>• Increase number of users</li> <li>• Increase engagement and loyalty</li> </ul>
Cable Operator	<ul style="list-style-type: none"> <li>• Provide users with voice service (wireline)</li> <li>• Provide users with TV service (wireline)</li> <li>• Provide users with High Bandwidth Internet Access (wireline)</li> <li>• Provide users with services over the cable infrastructure.</li> </ul>	<ul style="list-style-type: none"> <li>• Improve ROI for CAPEX</li> <li>• Increase sources of revenues</li> <li>• Increase number of users</li> <li>• Increase engagement and loyalty</li> </ul>
OTT content providers	<ul style="list-style-type: none"> <li>• Provide users with different content and services over the Internet</li> </ul>	<ul style="list-style-type: none"> <li>• Increase number of users</li> </ul>
Content Delivery Network (CDN)	<ul style="list-style-type: none"> <li>• Serve content to end-users with high availability and high performance</li> </ul>	<ul style="list-style-type: none"> <li>• Increase sources of revenues</li> </ul>
Advertiser	<ul style="list-style-type: none"> <li>• Serve advertising to end-users</li> </ul>	<ul style="list-style-type: none"> <li>• Increase effectiveness of advertising methods</li> </ul>

*Table 1. Stakeholder's needs and goals*

## **4. Research Approach**

This research has been conducted in three differentiated phases.

### **1. Literature review**

A literature review has been done to understand the industry trends. Companies' strategies in US and Europe were also reviewed to analyze users' common behaviors and differences. Case studies, technical journals and papers were analyzed to understand the main assets and internal capabilities that the different companies in the Internet ecosystem have focusing on telecom operators and which ones are the main drivers of revenues.

### **2. Quantitative Analysis**

A quantitative analysis was performed to understand how consumers are actually spending their money. Data from different sources was used to come up with numbers for the different services/products for each market: US, UK and Spain.

### **3. Interviews**

More than 40 Interviews were conducted with different stakeholders in the Internet ecosystem across different companies in Europe and US. The interviewees included technical engineers, content publishers, division managers and strategy managers and companies included telecomm operators, cable operators, Internet players, media companies, ecommerce companies, manufacturers and online advertising companies.

The interviews had two main goals: The first one was to check the reactions to the results of the quantitative analysis and the second one to evaluate interviewees' opinions about new opportunities.

## **5. Thesis Organization**

This thesis is organized in six main chapters. Chapter one gives an introduction to the problem and establishes the guidelines. Chapter two is focused in the consumer expenditures: first there is a global analysis, second a detailed analysis for the US case and finally the results of the same analysis for Spain and UK with a comparison of the results.

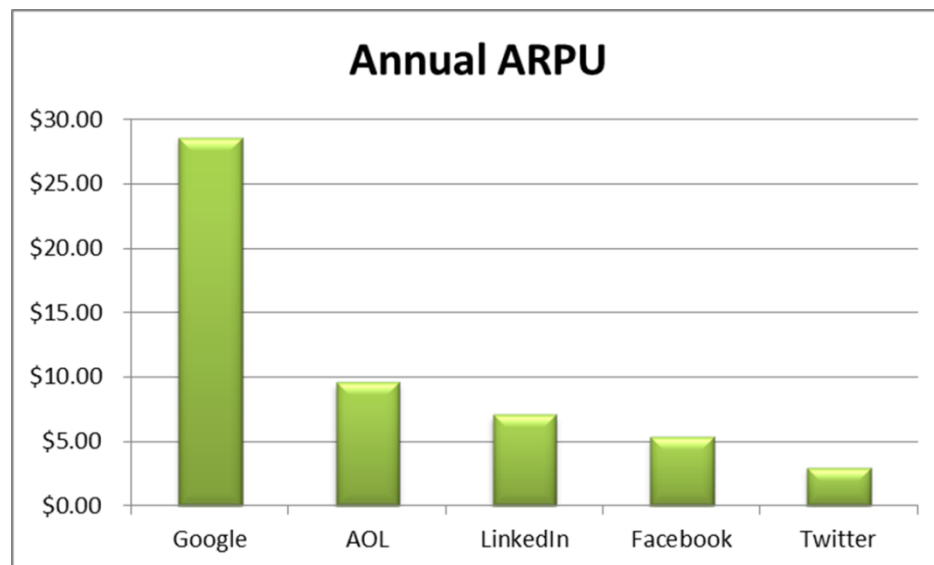
Chapter three analyzes the data using insights from the interviews conducted for this thesis and highlights the most interesting points. Chapter four defines new business opportunities according to the quantitative analysis and to the insights from the interviews. Finally, chapter five provides a summary of the most relevant conclusions and chapter six sets the main guideline for future work.

# Chapter 2 – Consumer Expenditures

## 1. Global numbers

### 1.1. Internet and Social Networks

To have a first idea of the different amount of revenues that are on the Internet, it is useful to look at the worldwide revenues of some of the most popular Internet companies for the year 2012. Looking at the annual Average Revenue Per User (ARPU) of five of the main Internet players, some interesting differences can be seen in Figure 1. Users include all individual users of the services.



*Figure 1. Annual ARPUs for Internet companies, year 2012<sup>4</sup>*

There are different sources of revenues for all these companies but they all have a thing in common: for all of them most of the revenues come from advertising. Then the other part can come from different sources:

- In Google, non-ads businesses include movie rentals or app purchases using Google Play. Around 95% of Google's revenues come from advertising<sup>5</sup>

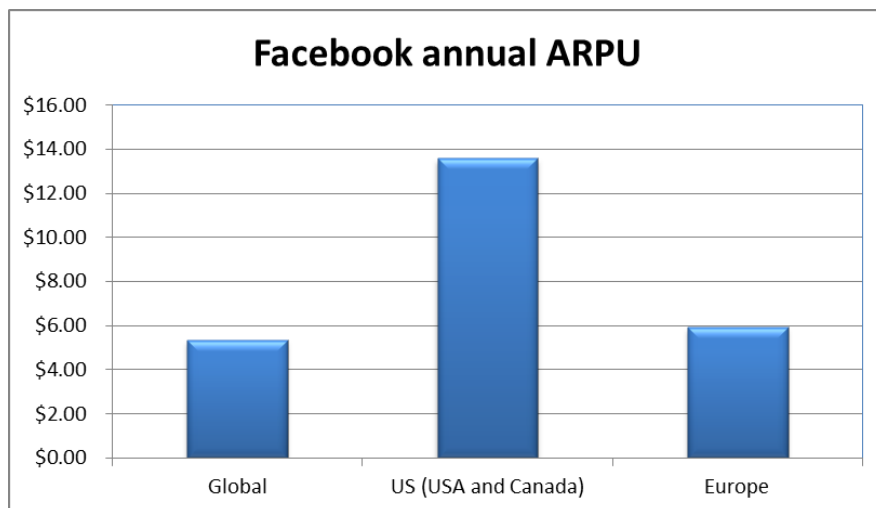
<sup>4</sup> Sources: Companies Annual Reports 2012, <http://money.cnn.com/2012/05/16/technology/facebook-arpu/index.htm>, Last visited January 20<sup>th</sup>, 2014.

<sup>5</sup> Source: Google Annual Report 2012. Excludes Motorola revenues.

- For AOL and LinkedIn, the second source of revenues is the subscription fee that users pay to have access to premium services.
- For Facebook, the second source of revenues is the sales of third-party products and services.
- For Twitter the second source of revenues is the sales of licenses to mine the data available on its service.

Note that the numbers in Figure 1 are global numbers per user of the service.

It is also important to look at some numbers that compare consumers in US and consumers in Europe. Figure 2 and Figure 3 show the breakdown of the revenues for Facebook per continent. Looking at the graphs, some differences between Europe and North America can be seen.



**Figure 2. Total Facebook annual ARPU comparison, year 2012<sup>6</sup>**

---

<sup>6</sup> Source: Facebook Annual Report 2012

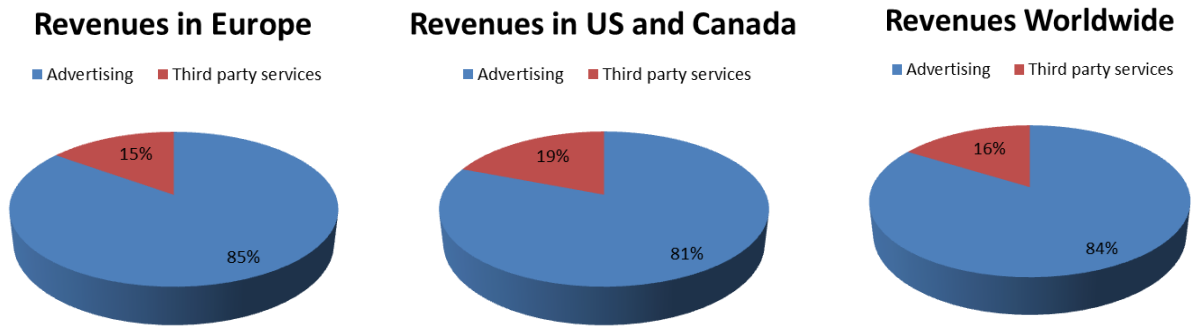


Figure 3. Facebook ARPU breakdown comparison, year 2012<sup>7</sup>

Comparing the revenue breakdown in the US with the one in Europe, there is no big difference (81% vs 85% of revenues from advertising). But looking at the total ARPU, the one in the US is more than twice the one in Europe, which may mean that the amount of advertising in Facebook in US is much higher than the one in Europe.

It is also important to note that for the freemium services (users can have a limited version of the version for free, and pay for a premium version) such as LinkedIn and AOL, there are two types of users: the ones who only use the free part of the service, and the ones who also pay for the extended features. Figure 4 shows how this affects the ARPU for AOL.

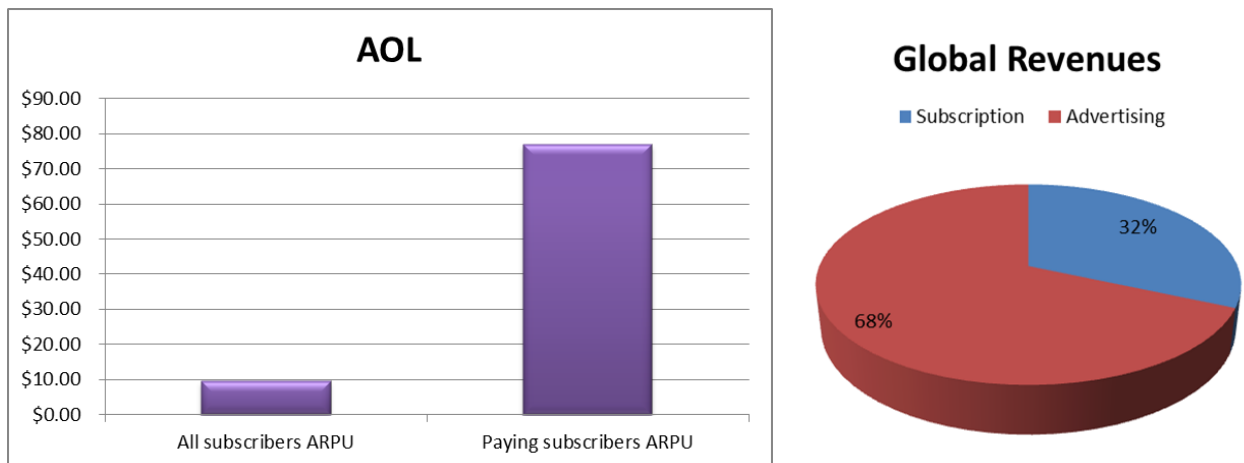


Figure 4. AOL ARPU for the total number of customers and only for paying subscribers and revenue breakdown, year 2012<sup>8</sup>

<sup>7</sup> Source: Facebook Annual Report 2012

## 1.2. Media companies

Looking at some of the OTT media companies' revenues, interesting information can be found about how much money they make. The ARPU for global users are shown in Figure 5.

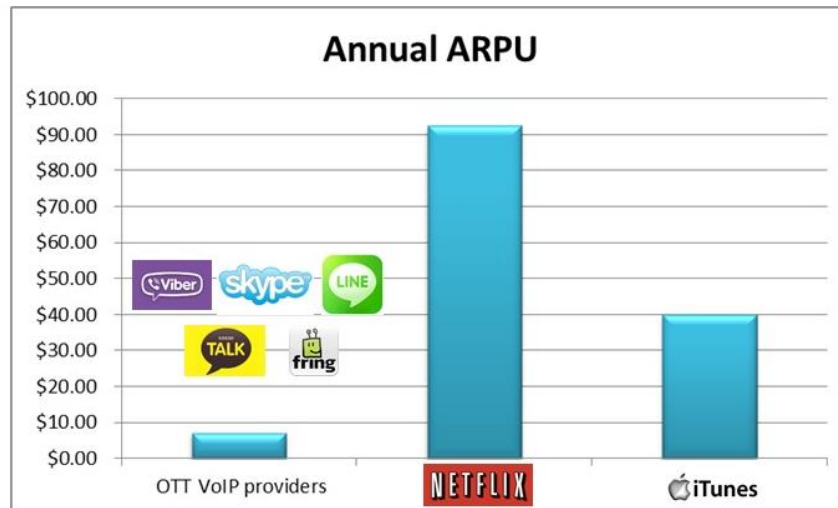


Figure 5. Media revenues, year 2012<sup>9</sup>

It can be seen that the set of VoIP providers are making around \$7, which is really tiny. Since the subscription based model is not sustainable, they are turning to advertising (Skype), third-party services (Line) or agreements with traditional operators.

Regarding Netflix, each one of the global customers is giving around \$90 to the company. The comparison between the ARPU for streaming and DVD service, and also between the US and the rest of the countries where Netflix can be also seen in Figure 6.

<sup>8</sup> Source: AOL Annual Report 2012

<sup>9</sup> Sources: Infonetics (VoIP providers), Netflix annual report and Asymco (iTunes)



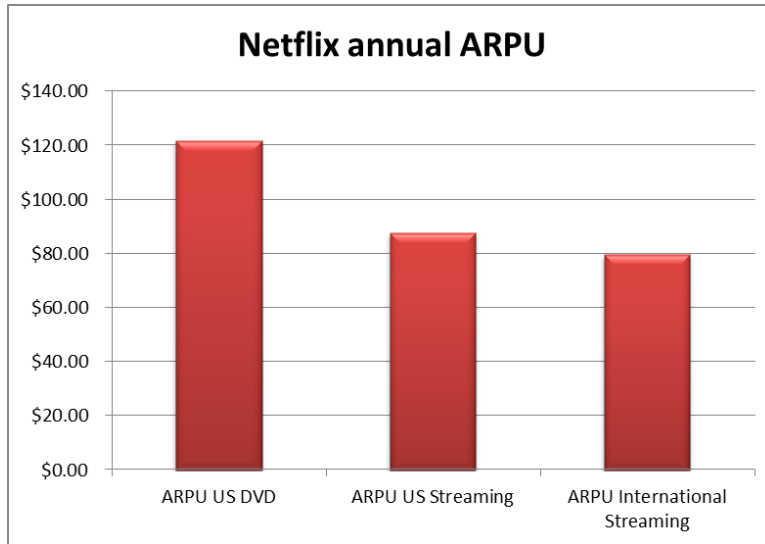


Figure 6. Netflix ARPU comparison, year 2012<sup>10</sup>

Finally, regarding iTunes, each global user is spending around \$40 per quarter. Since Apple does not provide a breakdown of the revenues by service this number is only one estimation. The number of users and evolution of the ARPU can be found in the Figure 7.

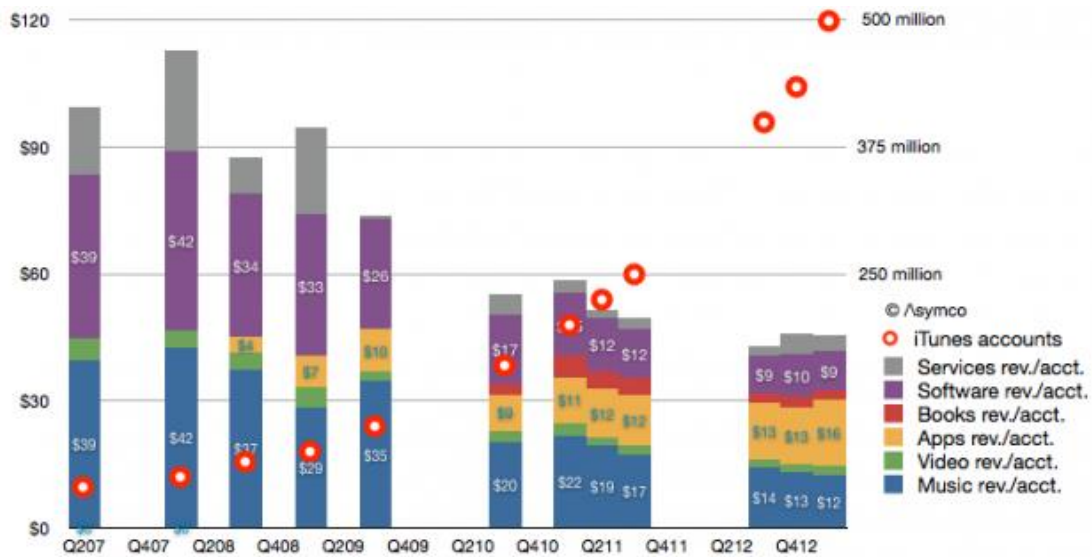


Figure 7. iTunes quarterly revenue mix/account vs iTunes accounts<sup>11</sup>

<sup>10</sup> Source: Netflix annual report 2012

<sup>11</sup> Source: Asymco, <http://www.asymco.com/2013/06/19/measuring-the-itunes-video-store/>, Last visited January 20<sup>th</sup>, 2014.

### **1.3. First conclusions**

Looking at the previous section, it is clear that companies have two main sources of revenues: the money that consumer spends in different services and the advertising. Apart from the money that consumers spend on things like paid content, the only money that flows into the Internet ecosystem is the one from the advertising. This leads to one interesting question:

- How much money is there on advertising?

And thinking about the real role of advertising in the Internet ecosystem, it will be very useful to complete the analysis started in this section to find out how much money consumers spend in digital services and in access to the network among other services.

Next chapter answers this question, comparing the expenditure levels in the US and in Europe.

## **2. Consumer expenditures in US**

In order to estimate the money in the Internet ecosystem, a consumer approach will be used. Two different types of expenditures will be considered:

- Direct Expenditures: the expenditures that consumers directly spend in access, and services. Numbers will be normalized using the number of households with broadband access.
- Indirect Expenditures: expenditures that cannot be attributed to direct consumer expenditures but that are very important to understand the Internet ecosystem. Numbers will also be normalized by the number of households with broadband access.

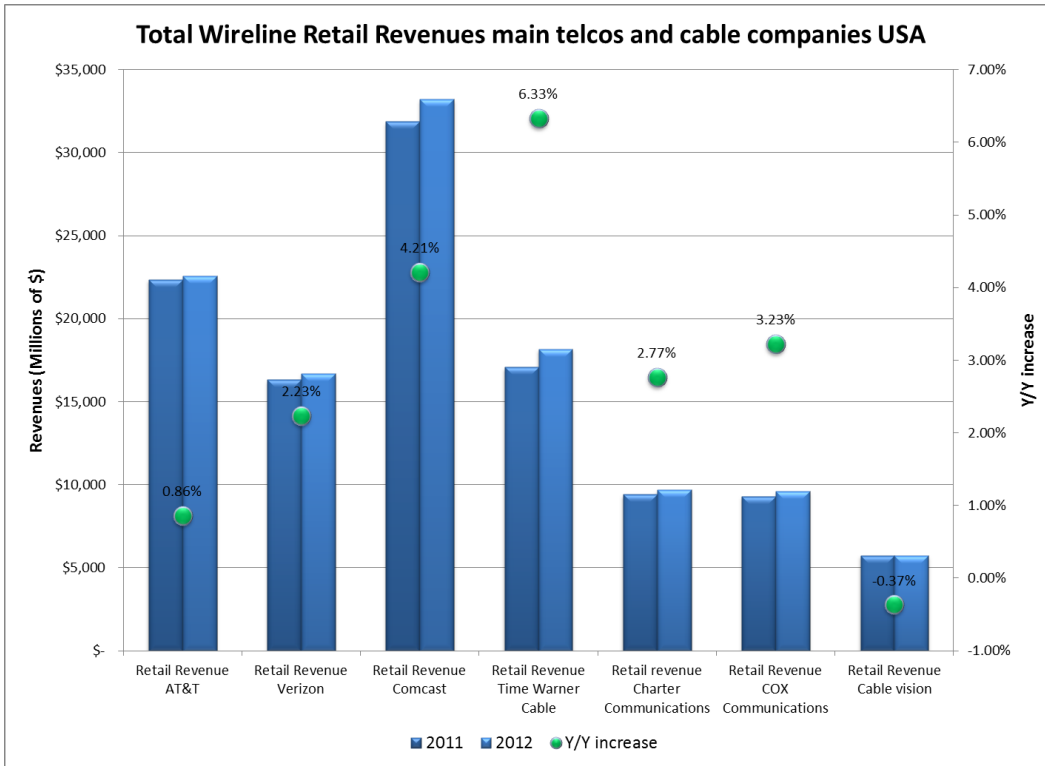
### **2.1. Direct Expenditures**

#### **2.1.1. Wireline Services**

To calculate how much money consumers spend in wireline services, data from annual reports from companies have been used for year 2012. Data for retail revenues have been used in case it is clearly specified in the annual or quarterly report. If not, proxies that will be explained accordingly have been made. The companies included in the analysis for the wireline segment are:

- Telcos: AT&T and Verizon. Sprint has not been chosen because Sprint wireline is focused on B2B rather than in B2C.
- Cable Companies: Comcast, Time Warner Cable, Charter Communications, COX Communications and CableVision.

Figure 8 shows the total amount of revenues that the main telcos and cable companies are receiving from the retail market for offering wireline services, the comparison with year 2011, and the increase from one year to the other one.



**Figure 8. Wireline Retail Revenues main telcos and cable companies<sup>12</sup>**

The first important thing to note is that all the companies except Cable Vision are increasing their revenues in 2012 compared to 2011. In addition, summing these numbers shows that the total revenue telcos and cable companies are having from the end user in the wireline segment is around \$115 billion, as shown in table 2.

	<b>2011</b>	<b>2012</b>	<b>Y/Y increase</b>
Total Wireline Retail Revenues	\$ 112,129	\$ 115,651	3.14%

**Table 2. Total wireline retail revenues**

This number alone does not give a lot of information. To understand better what it really means, it is probably more useful to think of how much each one of the US households with broadband access in the United States accounts for. That way, the number of US

<sup>12</sup> Sources: annual reports companies, year 2012.

households with broadband access will be the atomic unit, and will be used throughout this thesis. As mentioned before, this metric will give a better idea of the importance of the numbers.

According to the National Telecommunications and Information Administration (NTIA), 88 million households had high-speed Internet at home at the end of 2012.<sup>13</sup> Using this number and the number for the retail revenues in 2012, I conclude that **the average broadband household in the US spent \$109.52 per month in wireline services in 2012.**

This number already provides interesting information, but it will be even more interesting if it is broken down into the three different services offered to the residential market : voice, video and broadband access. These services are usually offered in bundles, and it is usually difficult to know how much users are really paying for each one of the service or how much they value each one of the services. However, using data from annual reports and estimation when needed the next sections gives the numbers.








### **2.1.1.1. TV and Video Services**

To come up with a number for the TV and video services, numbers for the video revenues for each one of the companies have been used. For telcos, information for AT&T U-verse service and for Verizon FiOS service has been used. For cable operators numbers for TV commercial services revenues have been included.

The numbers with the revenues as well as the number of subscribers and the monthly estimated revenues per subscriber are shown in Table 3.

---

<sup>13</sup> <http://www.ntia.doc.gov/blog/2013/household-broadband-adoption-climbs-724-percent>, Last visited January 20<sup>th</sup>, 2014.

	Video Revenues (millions)	Number of Video Subscribers	Monthly revenues per subscriber
	\$ 4,624	4,536,000	\$ 84.96
	\$ 6,105	4,726,000	\$ 107.66
	\$ 20,112	22,400,000	\$ 74.82
	\$ 10,917	12,030,000	\$ 75.62
	\$ 3,989	3,484,000	\$ 95.41
	\$ 5,760	5,000,000	\$ 96.00
	\$ 3,443	3,197,000	\$ 89.75
<b>TOTAL</b>	<b>\$ 54,951</b>	<b>55,373,000</b>	<b>\$ 82.74</b>

*Table 3. Video revenues for telcos and cable companies<sup>14</sup>*

Looking at the table, the estimated revenue per subscriber (or paying household) is \$82.74. But this is not the revenue per broadband household, since there are “only” around 55 million TV/video subscribers, that is, around 55 million households with pay TV/video service. Taking the total amount of video revenues and dividing it by 88 million of broadband households shows that **the average broadband household spent \$52.04 average in TV/video services from telcos and cable operators in 2012.**

As explained before, the reason why this number is lower than the expenditure per paying subscriber is because there are around 33 million households with Internet but without TV/video services with telcos or cable operators.

And the reason why the second number (\$52.04) will be used is that the broadband household is the atomic unit, as mentioned before. To make a fair comparison with the different numbers, it is essential to use the same units.


---

<sup>14</sup> Verizon FiOS revenues is a proxy according to the number of FiOS users. COX number of subscribers is also a proxy since COX do not make public financial information as it is privately owned.

US households can also have other video services with Satellite providers and Over The Top Video Providers. However, these numbers will not be included in this section for two main reasons:

- To have Satellite TV, consumers do not need to have Internet access, so it is out of the scope of the Internet ecosystem.
- The expenditures in OTT video will be computed in the eCommerce section.

However, to give a global view of the TV and video expenditures in the US to the reader, data regarding total revenues, number of subscribers and estimated revenues per subscriber for Satellite providers and OTT video providers is shown in Tables 4 and 5. The companies included are DirectTV and Dish for satellite and Netflix and Hulu for OTT video providers.

	Video Revenues (millions)	Number of Video Subscribers	Monthly revenues per subscriber
	\$ 23,235	20,100,000	\$ 96.33
	\$ 13,086	14,056,000	\$ 77.58
<b>TOTAL</b>	<b>\$ 36,321</b>	<b>34,156,000</b>	<b>\$ 88.62</b>

*Table 4. Video revenues for TV satellite providers*

	Video Revenues (millions)	Number of Video Subscribers	Monthly revenues per subscriber
	\$ 2,185	27,146,000	\$ 6.71
	\$ 695	3,000,000	\$ 19.31
<b>TOTAL</b>	<b>\$ 2,880</b>	<b>30,146,000</b>	<b>\$ 7.96</b>

*Table 5 Video revenues OTT video providers*

And finally, to have a global idea of how much money is in the TV and video space, Figure 9 shows a picture of the three main sources of revenues. However, as explained before,

for the analysis in this thesis only the money that users are spending in TV and video with telcos and cable operators will be considered. Money spent in satellite TV will not be included and money spent in OTT video providers will be included in other section.

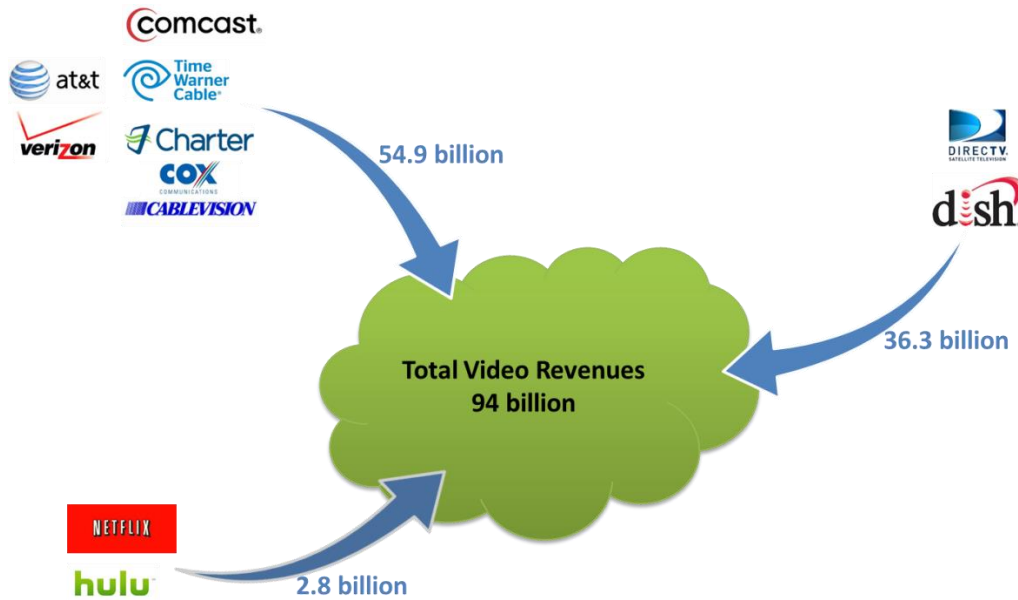


Figure 9. Total money spent in TV and video services

### 2.1.1.2. Broadband access and Voice

Subtracting the video expenditures from the total retail expenditures shows that in 2012 the average broadband household spent **\$57.48 per month in voice and broadband access**, the other two services usually included inside the commercial bundles. This number is very similar to the one provided by the FCC<sup>15</sup> for 2011, which said that consumers paid an average of \$61.80 for these two services. This similarity indicates that the analysis done so far is probably good enough.

<sup>15</sup> International Broadband Data Report, third report, Federal Communications Commission, August 2012. Selected data from 1-25Mbps basket to be consistent with the definition of broadband household by NTIA.



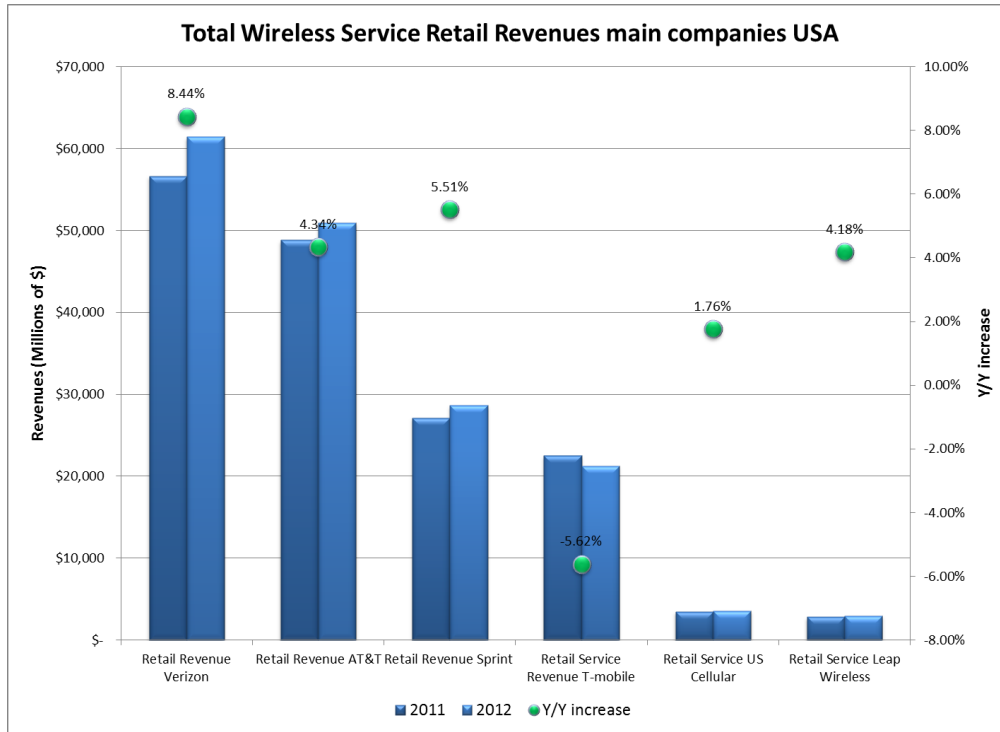
Again, it is also important to know how much consumers spend in each one of these two services, so doing a very similar analysis to the one done for TV and video services, and using the same companies it was found that:

- The average US broadband household spent **\$41.90 per month in wireline broadband access** in 2012.
- The average US broadband household spent **\$15.58 per month in wireline voice services** in 2012.

### **2.1.2. Wireless Services**

This section shows the wireless expenditures per broadband household. The same method than in previous sections has been used: data from annual reports has been used to analyze how much money consumers spend in Wireless Services in the US. The companies included in the analysis are AT&T, Verizon, Sprint, T-mobile, US Cellular and Leap Wireless.

Figure 10 shows the total amount of revenues main telcos and cable companies are receiving from the retail market for offering wireless services, the comparison with year 2011, and the increase from one year to the other one. It is important to note that these are the revenues companies are getting only from services; revenues for equipment sales have not been taken into account.



**Figure 10. Wireless Service Retail Revenues main telcos and cable companies<sup>16</sup>**

Looking at the graph it is clear that all the companies except T-mobile are growing and that growths are higher than the ones for wireline. Again, summing all these numbers shows that the total revenues wireless companies are having from the end users in the wireless segment is around \$168 billion, as shown in table 6.

	2011	2012	Y/Y increase
Total Wireline Service Retail Revenues	\$ 161,473	\$ 168,780	4.53%

**Table 6. Total Wireless Service retail revenues**

Wireless companies are offering two different types of wireless services: voice services and data services. Ideally, it would be great to come up with a number for each one of these

<sup>16</sup> Sources: annual reports companies, year 2012.

services, but with the numbers in annual reports, it is very complicated to do a good estimation. For that reason, the overall number will be used.

Using the same procedure than the one used in previous sections shows that the average US broadband household spent **\$159.83 per month in wireless services** in 2012. That assumes that every US broadband (fixed) household has wireless service.

### **2.1.3. Ecommerce**

One of the other things on which consumers spend their money is ecommerce. Data in Figures 11 and 12 show how consumers are spending more and more money online. Also, retailers are going online to increase their sales. Therefore, it seems very interesting to know how much money consumers are spending.

To answer this question, a procedure similar than the one used before has been followed. The only problem here is that there are many different numbers from different sources for the ecommerce expenditure, partially because ecommerce is a very wide term. Before going into the details of the number, it is important to comment that when this thesis talks about ecommerce, it considers that consumers are buying three different things:

- Physical things
- Travelling
- Digital content and subscriptions to digital services

Since different numbers have been found, the most conservative option will be chosen to know at least how much money users spend. Figure 11 shows the US retail ecommerce sales and Figure 12 shows the proportion of the mcommerce.

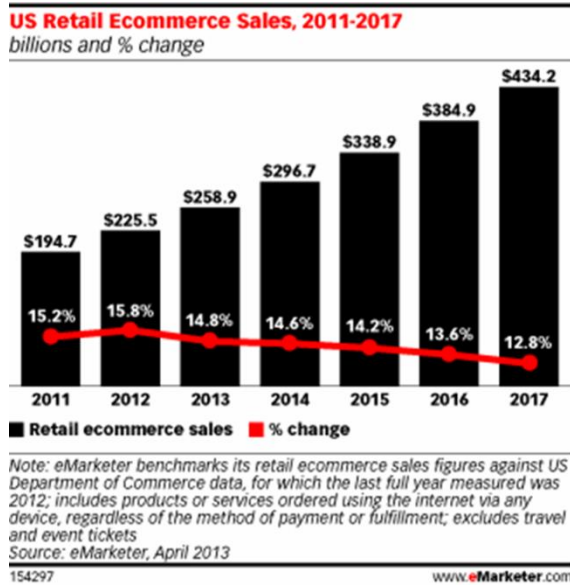


Figure 11. US Retail Ecommerce Sales<sup>17</sup>



Figure 12. US Retail Mcommerce Sales<sup>18</sup>

Regarding Figures 11 and 12, it is important to note that numbers for 2011 and 2012 comes from real data from the US Department of Commerce, according to eMarketer.com. Numbers for year 2013 and for the following ones are only estimations. It is also important to note that this number does not include travel and online tickets.

Therefore, using the number for the US and the number of US broadband households it can be seen the average **US broadband household spent \$213.54 in physical stuff and digital content and subscription in 2012**. This number is already interesting, but again, it would be very interesting to know how much users are spending only in digital content and subscription. This is a really tough question because no precise information exists and there are currently a lot of different companies offering digital content and services, but next section gives two limits.

<sup>17</sup> Source: eMarketer.com

<sup>18</sup> Source: eMarketer.com

### 2.1.3.1. Digital content and Subscription to digital services

For the upper limit, looking at the breakdown of the US ecommerce sales in different categories in Figure 13 is useful.

<b>US Retail Ecommerce Sales, by Product Category, 2011-2016</b>						
<i>billions</i>						
	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>
Computer & consumer electronics	\$42.0	\$49.3	\$56.8	\$66.2	\$76.5	\$87.9
Apparel & accessories	\$37.6	\$45.6	\$54.2	\$64.5	\$75.7	\$87.8
Auto & parts	\$21.6	\$23.7	\$25.5	\$27.8	\$30.5	\$33.5
Books/music/video	\$17.4	\$20.8	\$24.4	\$28.6	\$33.2	\$38.4
Furniture & home furnishings	\$15.1	\$17.7	\$20.2	\$23.3	\$26.9	\$30.9
Toys & hobby	\$9.5	\$11.2	\$13.1	\$15.3	\$17.8	\$20.7
Health & personal care	\$9.3	\$10.9	\$12.5	\$14.4	\$16.5	\$18.8
Office equipment & supplies	\$6.5	\$7.3	\$8.0	\$8.8	\$9.6	\$10.5
Food & beverage	\$4.3	\$5.0	\$5.8	\$6.8	\$8.0	\$9.4
Other	\$31.4	\$34.0	\$38.4	\$40.9	\$44.1	\$47.2
<b>Total</b>	<b>\$194.7</b>	<b>\$225.5</b>	<b>\$258.9</b>	<b>\$296.7</b>	<b>\$338.9</b>	<b>\$384.9</b>

*Note: eMarketer benchmarks its retail ecommerce sales figures against US Department of Commerce data, for which the last full year measured was 2012; includes products or services ordered using the internet via any device, regardless of the method of payment or fulfillment; excludes travel and event tickets*  
*Source: eMarketer, April 2013*

154302 www.eMarketer.com

**Figure 13 US Retail Ecommerce sales by category**

Looking at these numbers shows that the maximum total money spent in digital content and subscriptions is \$54.8 billion, the sum of “Books/music/video” and “Others”. This means that the average US broadband household spent a maximum of \$51.89 per month in 2012. This is the upper limit.

To estimate a lower limit, a company approach can be used. Looking at the main digital companies in the Internet ecosystem which are receiving revenues from subscription fees, and seeing how much they are getting can give good insights. Companies chosen for this analysis are:

- Netflix and Hulu from the video industry
- Pandora and iTunes from music

- AOL and NYTimes from newspaper and general information
- Google Play Store and Apple App Store from the applications stores area.
- Candy Crush and World of Warcraft from the game industry.

Next step is to estimate the total revenues these companies received in 2012 through subscription fees. Table 7 shows the estimations.

<b>Company</b>	<b>Online Revenue Estimation, year 2012 (millions)</b>
Netflix	\$ 2200
Hulu	\$ 700
iTunes	\$ 9600
Pandora	\$ 275
AOL	\$ 200
NYTimes	\$ 21
Google Play store	\$ 285
iPhone App Store	\$ 615
Candy Crush	\$ 1000
World of Warcraft	\$ 1200

*Table 7. Revenues for Content and Subscription services providers, year 2012.*<sup>19</sup>

- Data for Netflix, Hulu and Pandora comes from the official revenues for year 2012.
- For iTunes, in 2010 it was estimated that there were 50 million users in the US<sup>20</sup>. Going back to section 1 of this thesis and seeing the evolution of numbers of users, it may not be wrong to say that in 2012, there were at least 60 million users (again, taking a conservative option). Multiplying this number of users by the ARPU of \$160/year gives the estimation of \$9600.
- For AOL, the ARPU for paying subscribers have been used along with the estimated number of paying subscribers (around 2.6 million)<sup>21</sup>

<sup>19</sup> Sources: annual reports for Netflix, Hulu and Pandora and estimations for the rest.

<sup>20</sup> [https://www.npd.com/wps/portal/npd/us/news/press-releases/pr\\_100714/](https://www.npd.com/wps/portal/npd/us/news/press-releases/pr_100714/), Last visited January 20<sup>th</sup>, 2014.

<sup>21</sup> <http://consumerist.com/2013/08/08/believe-it-or-not-2-58-million-people-still-pay-for-aol-service/>, Last visited January 20<sup>th</sup>, 2014.

- For NYtimes, the online ARPU is around \$30<sup>22</sup>, and the estimated number of customers is 700,000<sup>23</sup>
- For Google Play Store, Global revenues per day are around \$3M<sup>24</sup>, and US accounts for 26% of them<sup>25</sup>.
- For Apple Play Store, revenues per day are around \$5.4M<sup>26</sup> and US account for 33% of them<sup>27</sup>.
- For Candy Crush and World of Warcraft the estimated revenues are around \$1 billion and \$1.2 billion<sup>28</sup>

Summing all these amounts and dividing them by the number of US broadband households shows that the average **US broadband household spent at least \$15.24 in digital content and subscription in 2012**. This is a very simple analysis that gives a very conservative number.

Putting together the two limits, I conclude that the average US household with broadband access spent something between \$15.24 and \$51.89 in digital content and subscription services per month in 2012.

Since the analysis is not complete and only a few companies have been considered, it may be fair to think that the lower limit will be higher. But even though the analysis is simple, this number gives a very interesting idea.

To complement this idea, it is also useful to see the trends. According to comScore<sup>29</sup>, digital content and subscriptions is the top 1 growing category inside expenditures in ecommerce:

---

<sup>22</sup> <http://research.scoutanalytics.com/pricing/the-195-logic-of-the-new-york-times-paywall/>, Last visited January 20<sup>th</sup>, 2014.

<sup>23</sup> Source: emarketer

<sup>24</sup> Source: CCS Insight

<sup>25</sup> Source: Japan Overtakes USA, App Annie, November 2012.

<sup>26</sup> Source: Distimo

<sup>27</sup> Source: Japan Overtakes USA, App Annie, November 2012.

<sup>28</sup> Source: <http://www.dailyfinance.com/2013/10/16/candy-crush-addiction-shows-path-to-app-store-sale/>, Last visited January 20<sup>th</sup>, 2014.

- It grew 26% in 2012 compared to 2011
- In the first two quarters of 2013, there has been a 20% growth with respect to the first two quarters of 2012.

Therefore, it is fair to say that inside ecommerce, digital content and subscriptions will be one of the very interesting categories in the short term.

## **2.2. Indirect Expenditures**

Once the money that consumers spend on different services has been analyzed, this section gives an idea of how much money there is in advertising and CDN. Obviously, consumers are not paying directly to advertisers or CDN, and that is why these are called indirect expenditures. However, to compare these numbers with the numbers in previous sections, the same method will be followed.

There are two reasons why advertising and CDN are considered in this thesis:

- Historically, advertising has been seen by some companies as one of the main revenue sources in the Internet.
- Regarding CDN, there has been a growing interest in content delivery network from ISPs in the last years.

### **2.2.1. Online Advertising**

Looking at the Internet ecosystem, apart from the money that consumers spend on the different things studied in the previous section, there is only one source of money flowing into the system: advertising.

Where does this money go? It comes from the advertisers and it essentially pays for all what everyone knows as the free Internet experience. Two main questions emerge regarding advertising:

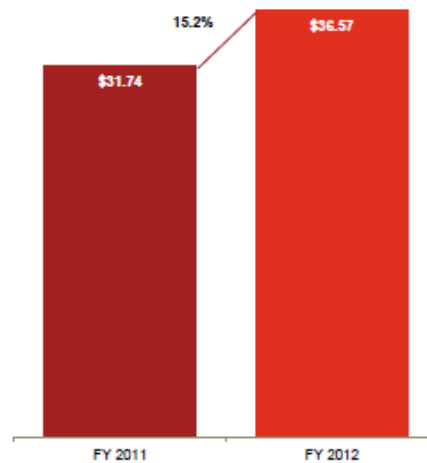
---

<sup>29</sup> US Digital Future in Focus 2013, comScore, 2013.



- How much money is there in online advertising?
- What is the real role of advertising in the Internet ecosystem?

To answer these questions, once again a number of dollars per US broadband household is provided, so that a fair comparison with the rest of the numbers can be made. The total number of revenue for the year 2012 shown in Figure 14 has been used.



**Figure 14. Online Advertising revenues US, 2012<sup>30</sup>**

It is important to mention that only 9% of the total online revenues come from mobile advertising. It seems that mobile advertising is still accounting for a very small portion of the advertising revenues, even though growth rate predictions are huge<sup>31</sup>.

Dividing the total revenues by the total number of broadband households shows that **the average US broadband household was worth \$34.63 in advertising in 2012**. This number means that if one US household liked to have a free-advertising Internet, it would have to pay \$34.63. That way, it will have a free-advertising Internet.

<sup>30</sup> Source: IAB, Internet Advertising Revenue Report 2012 Full Year Results.

<sup>31</sup> Source: <http://www.gartner.com/newsroom/id/2306215>, Last visited January 20<sup>th</sup>, 2014.

### 2.2.2. CDN

Regarding CDN, there is a particular interest in content delivery services, especially because of the predictions regarding video consumption, which is supposed to have a huge growth in the next years.<sup>32</sup>

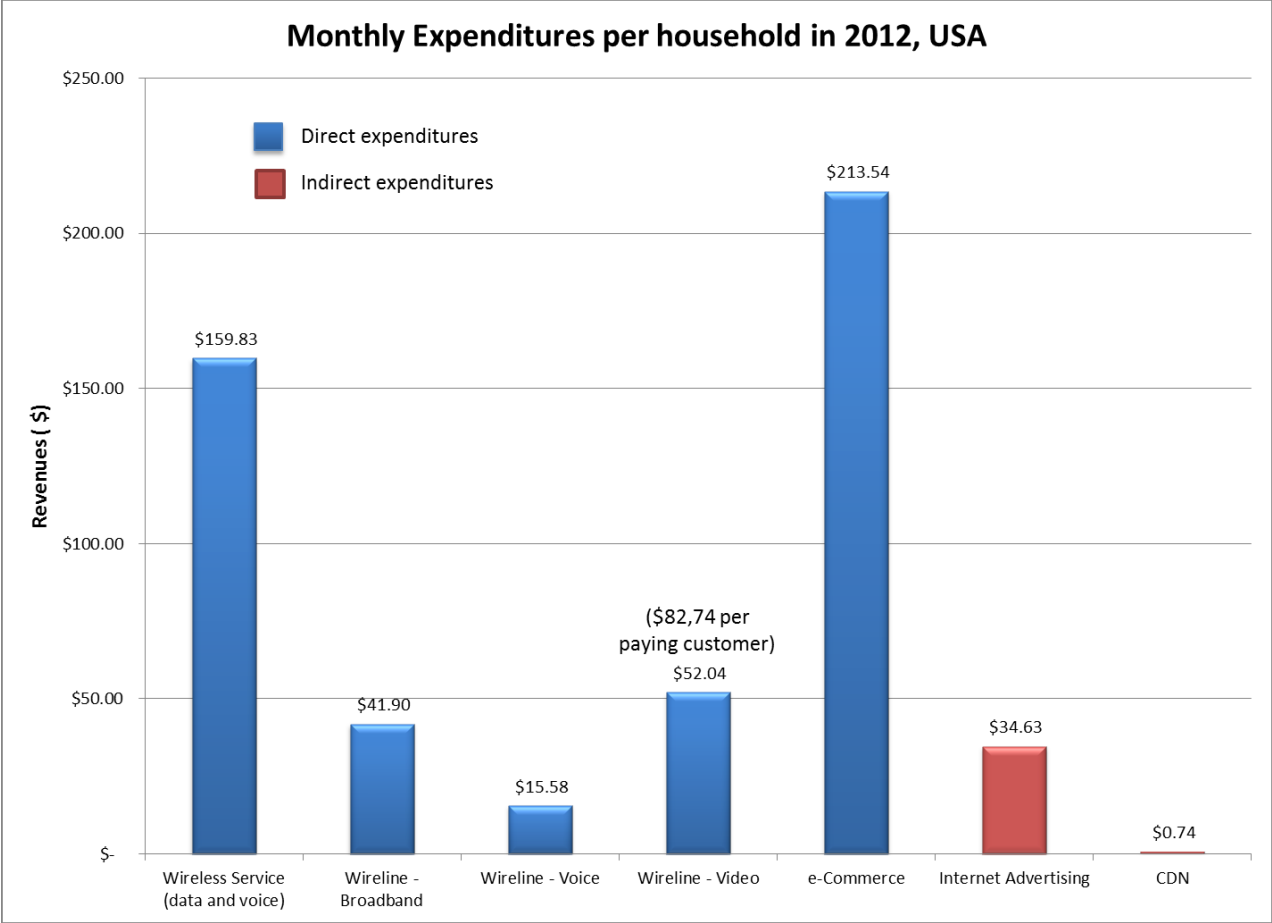
Doing a very similar analysis and taking into account the two main CDN companies in the US (Akamai and Limelight) it can be seen that the **average US broadband household was worth \$0.74 in 2012**, which is not a big amount of money. Again, this is not a direct expenditure from the consumers, but the number gives a very interesting idea.

### 2.3. Analysis

Putting together all the analysis done in sections 2.1 and 2.2, the differences between the different expenditure can be seen in Figure 15.

---

<sup>32</sup> Source: CISCO Visual Networking Index, 2013.



**Figure 15. Expenditures comparison for US households**

Once again, these expenditures are per broadband household and per month for the year 2012. For the wireless services, there are usually several wireless subscribers inside the same house. That is why the number may seem too high.

The main conclusions of the analysis are:

- Consumers are spending a significant amount of money in wireless services, video and ecommerce (digital things and digital services). The expenditures in digital services are growing fast.

- CDN business may be profitable, but the amount of revenues they get per household is tiny. That shows that probably it is not a good idea for carriers to build their own CDN unless the decision is part of a larger business plan.
- There is some money in the online advertising industry, but not as much as in other services.

## 3. Consumer expenditures in EU

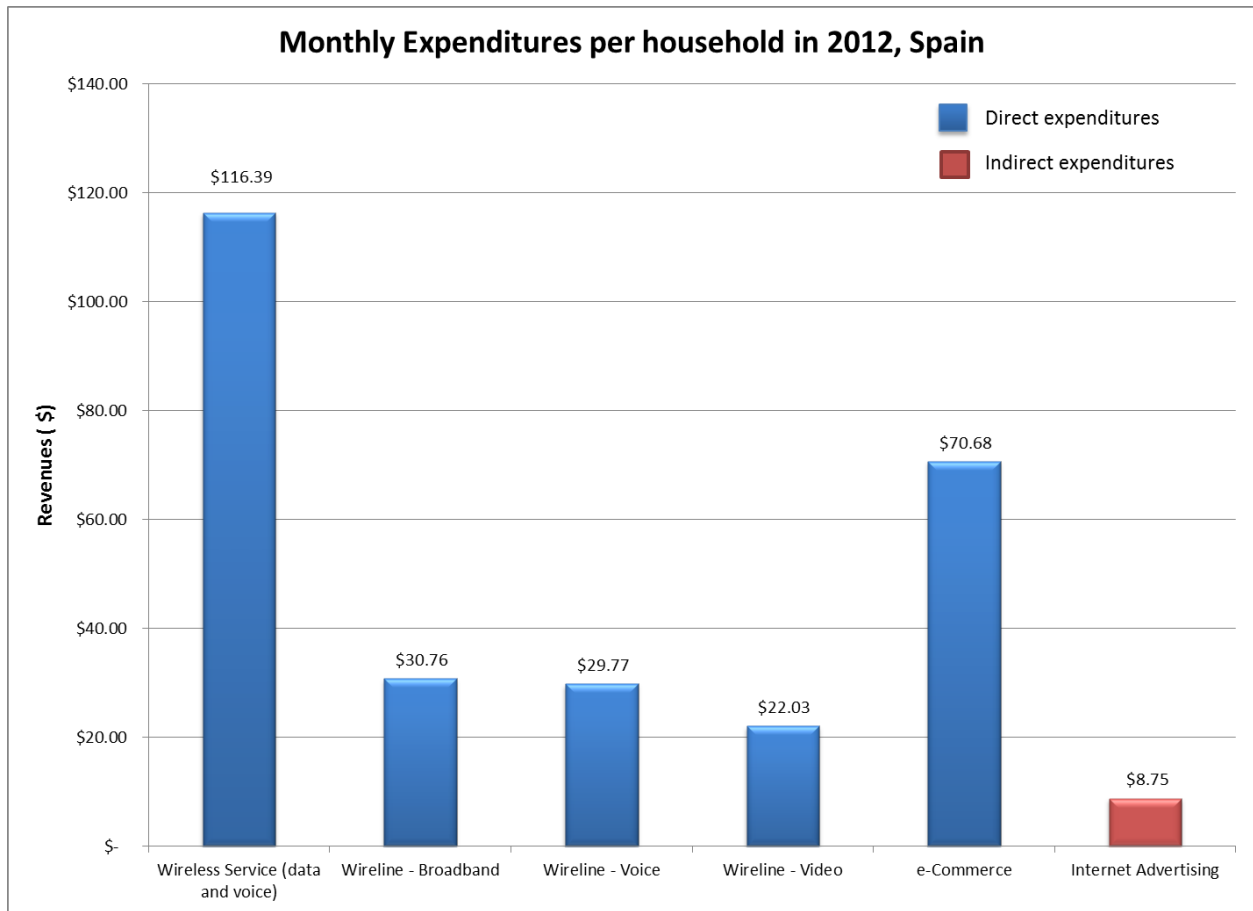
### 3.1. Spain

This section gives a summary of the analysis done for Spain. The same methodology than the one used for the US has been used.

To start, a brief description of the main players in the telecommunications industry in Spain is given:

- Telefonica (Movistar), Vodafone and France Telecom (Orange) are the three main carriers. They have both wireline and wireless business.
- In the wireline segment, Jazztel is the fourth main player
- In the wireless segment, Telia Sonera (Yoigo) is the fourth Mobile Network Operators (MNO) in Spain. In addition, ONO and Jazztel are the two most popular Mobile Virtual Network Operators (MVNO).
- ONO is the main cable company.

Doing a similar analysis than the one done in Chapter two for the US shows the results in Figure 16 for Spain. Data from companies and from the CMT (Comisión del Mercado de las Telecomunicaciones), the independent regulator, have been used. According to the CMT database, at the end of 2012 there were 11,564,000 households with broadband access in Spain. For ecommerce data from emarketer.com have been used again (again, excluding travel and online tickets to make a fair comparison), and for advertising data come from from IAB Europe. Finally, the value for the exchange rate euro/dollar for December 31<sup>st</sup> 2012 has been used.



**Figure 16. Consumer Expenditures in Spain<sup>33</sup>**

Looking at Figure 16, there are some differences with the US case:

- The expenditure in wireless service is lower. In the Spanish case, the total expenditure is around \$116.
- In wireline, there are some differences in Broadband access and in voice expenditures. In Spain, Broadband households spend more in voice services and less in broadband access.
- Regarding video, the expenditures in Spain are much lower.
- There is a big difference in ecommerce too, where broadband households only spend around \$70 per month (3 times less than in the US).

<sup>33</sup> Sources: Annual reports, CMT, IAB Europe and emarketer.com

- Finally, there is also a big difference in online advertising, where the average household in Spain is worth around \$8.75 per month.

### **3.2. UK**

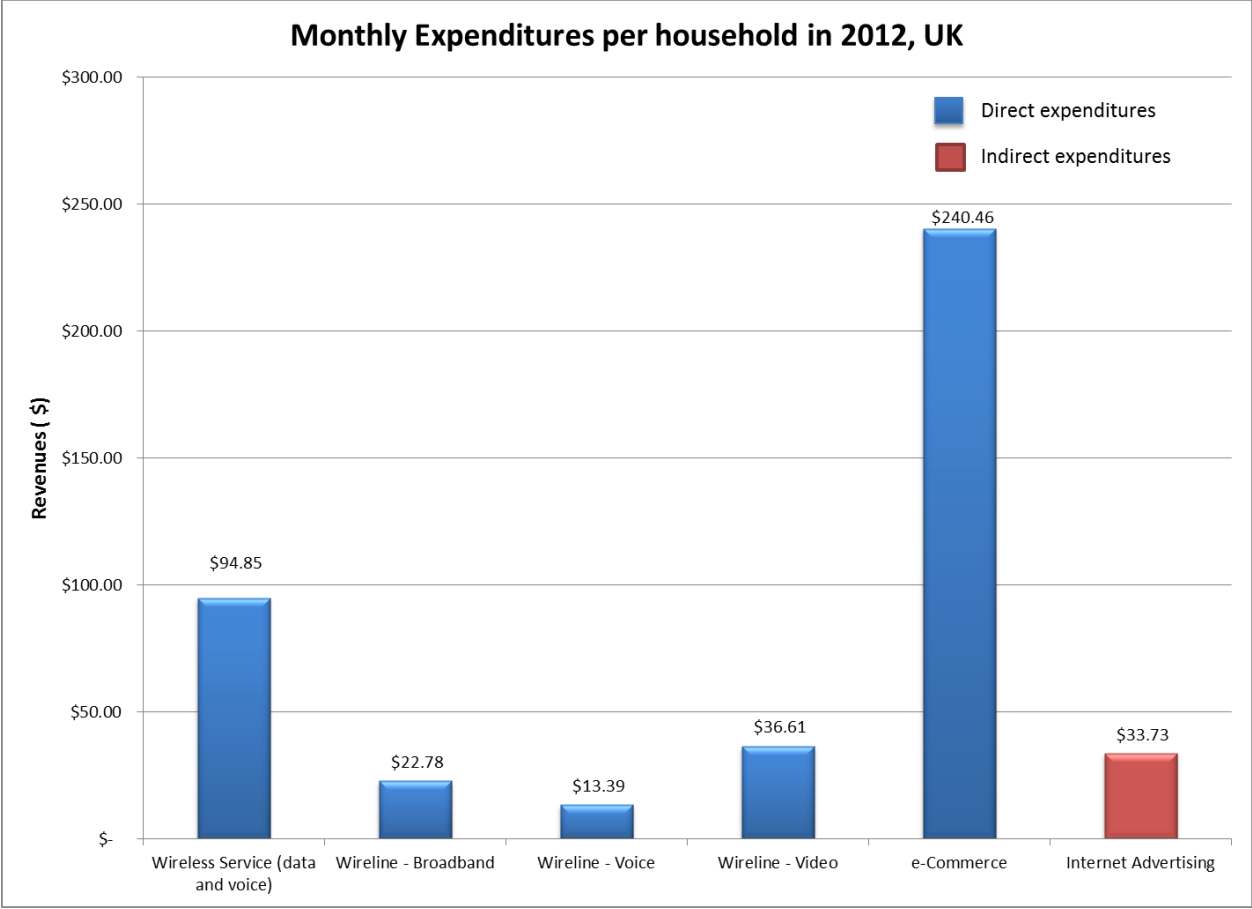
For the analysis of the UK, data from Ofcom<sup>34</sup> (the independent regulator and competition authority in the UK) have been used. The companies considered are Sky, BT, Virgin, TalkTalk, ESPN, TopUp TV, Netflix and BBC (iPlayer).

Data from Ofcom have been used for wireless and wireline (Broadband, Voice and Video) segments. For advertising, again data from emarketer.com without including travel and online tickets have been used and data for advertising come from IAB Europe. According to Ofcom, the number of households with broadband access in the UK in 2012 was 21,662,000. Finally, the exchange rate dollar/pound for December 31<sup>st</sup> 2012 has been used.

The result of the analysis is shown in Figure 17.

---

<sup>34</sup> Source: [www.ofcom.org.uk/](http://www.ofcom.org.uk/), Last visited January 20<sup>th</sup>, 2014.



**Figure 17. Consumer Expenditures in Spain<sup>35</sup>**

Again, some differences with the US and the Spanish case can be found:

- The expenditures in wireless service is the lowest one (around \$95)
- The expenditures in broadband (\$22.78) are around half the one in the US.
- The expenditures in voice are very low too.
- The expenditures in video are lower than in the US case.
- The expenditures in ecommerce per household are even higher than the ones in the US.
- The expenditures in advertising are very similar to the ones in US, and much bigger than the ones in Spain.

<sup>35</sup> Sources: Annual reports, Ofcom, IAB Europe, emarketer.com.



## 4. Comparison of results

Putting together all the numbers for the three different countries shows more clearly the differences. Table 8 shows the numbers.

	<b>Wireless</b>	<b>Wireline – Broadband</b>	<b>Wireline – Voice</b>	<b>Wireline – Video</b>	<b>Ecommerce</b>	<b>Online Advertising</b>
<b>USA</b>	\$ 159.83	\$ 41.90	\$ 15.58	\$ 52.04	\$ 213.54	\$ 34.63
<b>Spain</b>	\$ 116.39	\$ 30.76	\$ 29.77	\$ 22.03	\$ 70.68	\$ 8.75
<b>UK</b>	\$ 94.85	\$ 22.78	\$ 13.39	\$ 36.61	\$ 240.46	\$ 33.73

*Table 8. Broadband household expenditures comparison*

Looking at the table, three trends can be identified:

- 1) Wireless services, Wireline Broadband and Wireline Voice** services are much cheaper in UK.
- 2) Broadband Households pay less in Spain for Wireline Video.**
- 3) Ecommerce and online advertising** expenditures in US and UK are much higher than in Spain.

# Chapter 3 – Analysis

This section analyzes the data obtained from the quantitative analysis taking into account the insights from the interviews.

## 1. Wireless Services

Wireless services constitute one of the main sources of revenues for telecom operators. They consider that wireless business is the core business of the telcos and are putting a lot of effort to keep the number of customer high. Especially in Europe, telcos are very worried about customer churn as competition is increasing.

To increase their revenues in the wireless services, telecom operators are trying to steal customers from the competitors. To do that, they are increasing marketing efforts and budgets to come up with competitive commercial proposal to customers.

However, most of the telecom companies believe that voice and data wireless services will become a commodity soon. Even though they will use metered data plans, they believe that competition will eventually lower their margins. For that reason, most of the companies believe that they should become digital companies to offer services over the Internet rather than infrastructure-based services only. Some of them are already in the transformation process<sup>36</sup>.

There are other companies that do not agree with this statement and believe their business should only be in the infrastructure part, since it is where they have the know-how. They believe their future is more as a lean telco than as a digital player.

Regarding the differences in money spent by the consumers in wireless services in US and Europe, the reason can be one of the following:

- US consumers are paying more because they use more data.

---

<sup>36</sup> <http://blogthinkbig.com/en/be-more-cesar-alierta/>, Last visited January 20<sup>th</sup>, 2014.

- US consumers are paying more because they enjoy higher speeds.
- The wireless service in the US is simply more expensive.

Regarding the first point, the amount of data used can be important. It is important to highlight that both in Europe and US consumers have metered plans, so knowing data usage is essential because the more data consumers use, the more they will pay. The problem with the data usage is that there are different values from different sources. Tables 9 and 10 show two different comparisons from CISCO VNI and from Sandvine.

	<b>Average Mobile Data per Connection per month</b>	<b>Average Mobile Data per Broadband Household per month</b>
<b>USA</b>	568 MB	2.35 GB
<b>Spain</b>	337 MB	1.75 GB
<b>UK</b>	489 MB	1.80 GB

*Table 9. Average mobile data<sup>37</sup>*

	<b>U.S Fixed</b>	<b>U.S. Mobile</b>	<b>EU Fixed</b>	<b>EU Mobile</b>
<b>Total</b>	44.7 GB	390 MB	13.4 GB	311 MB

*Table 10. Average fixed and mobile data<sup>38</sup>*

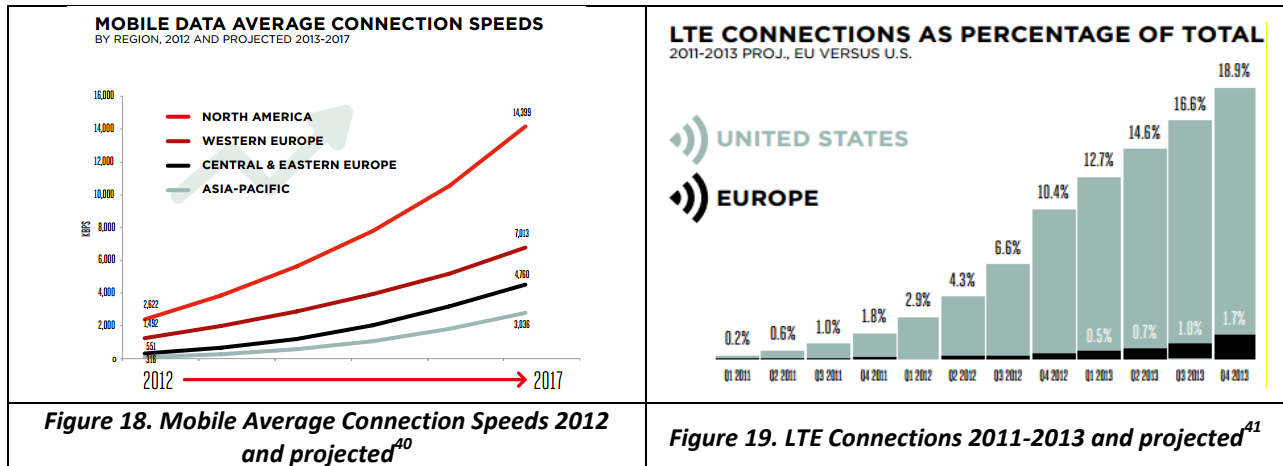
Looking at table 9, numbers say that usage in US is higher, but not much. Looking at table 10, US usage is higher than the average in the EU. In addition, according to Ofcom<sup>39</sup> UK users download more data per connection than US users. Therefore, even though it is not fully clear whether there is a difference or not in data usage, it seems reasonable to assume that it is very similar in US and UK.

<sup>37</sup> Source: CISCO VNI 2013

<sup>38</sup> Source: Sandvine Global Internet Phenomenon Report

<sup>39</sup> <http://stakeholders.ofcom.org.uk/market-data-research/market-data/communications-market-reports/cmr12/international/icmr-6.3>, Last visited January 20<sup>th</sup>, 2014.

Regarding the second point, it is true that the development of some technologies such as LTE in the US is more mature than the one in Europe and that leads to differences in speed. Figures 18 and 19 show some data regarding the different speeds and LTE coverage in US and EU.



Finally, regarding the third point, looking at the number of competitors in the US wireless market with respect to the one in Europe, it seems that the situation is very similar. To evaluate whether the level of competition is similar regardless of the number of players, a deeper analysis would be needed.

## 2. Wireline Services: Voice and Broadband

Voice and Broadband revenues in the wireline segments are commoditized, and companies do not expect to increase the average revenue per household in the next few years. It seems that even though a company can offer a better quality service, customers do not value quality for a broadband access. However, there is still a significant amount of money in fixed broadband segment, and companies do not want to lose it in the short term, but they believe it will continue decreasing.

<sup>40</sup> Source: GSMA Wireless Intelligence

<sup>41</sup> Source: CISCO VNI 2013

Again, companies are increasing marketing efforts to try to steal customers. They are bundling wireless and wireline solutions to increase the sales of the both services.

Regarding the differences in the amount of money consumers pay, the reason can be one of the following<sup>42</sup>:

- US consumers are paying more because they enjoy higher speeds.
- The wireline broadband service in the US is simply more expensive.

With respect to the different speeds, Figure 20 shows the average speed in the US is very similar to the one in UK.

Country/Region	Q2 '13 Avg. Mbps
– Global	3.3
1 South Korea	13.3
2 Japan	12.0
3 Switzerland	11.0
4 Hong Kong	10.8
5 Latvia	10.6
6 Netherlands	10.1
7 Czech Republic	9.8
8 United States	8.7
9 Sweden	8.4
10 United Kingdom	8.4

**Figure 20. Average connection speed per country<sup>43</sup>**

Therefore, it seems that the reason is that the wireline service is more expensive in the US. This may be related to the level of competition, which may be lower in the US than in Europe. In US consumers usually have the possibility to choose only between a cable operator

---

<sup>42</sup> Unlike the wireless service, the wireline service does not offer metered data plans; that is why data usage is not important in the wireline segment.

<sup>43</sup> Source: The State of the Internet, Akamai, Q2 2013

and a telco, while in Europe consumers usually have the possibility to choose among at least two telcos and a cable operator.

### **3. Wireline Services: Video**

Video is one of the main drivers of revenues and it will play an important role in the next years. Telecom operators are doing great marketing efforts to have more users on their video services, through bundle offers.

Having the right content is essential and it seems that video delivery over the Internet will play a very important role in the short and medium term. For that reason, companies are trying to do two different things:

- Partner with the most popular content creators to offer the best content.
- Building internal capabilities to offer video over Internet services.

Most of the telecomm companies are really interested in video services because of the high revenues and because video consumption is expected to grow a lot.

Regarding the different expenditures in different countries, it seems that the reason is related to the different levels of Pay TV penetration in the different countries. While in the US the Pay TV penetration rate was around 86% in 2012, in UK it was around 55% and in Spain it was only 24%<sup>44</sup>. In addition, big Internet players such as Netflix are not in Spain. There have been several initiatives to create OTT video platform in Spain, but so far they have not been successful.

Finally, most of the telecomm companies that started to create their own CDN have realized that it was not a good decision to increase their revenues by a big factor. They had to make big investments and the amount of revenues they are getting is tiny mainly because the money per broadband household they can get is very limited and also because competition from big players such as Akamai is fierce.

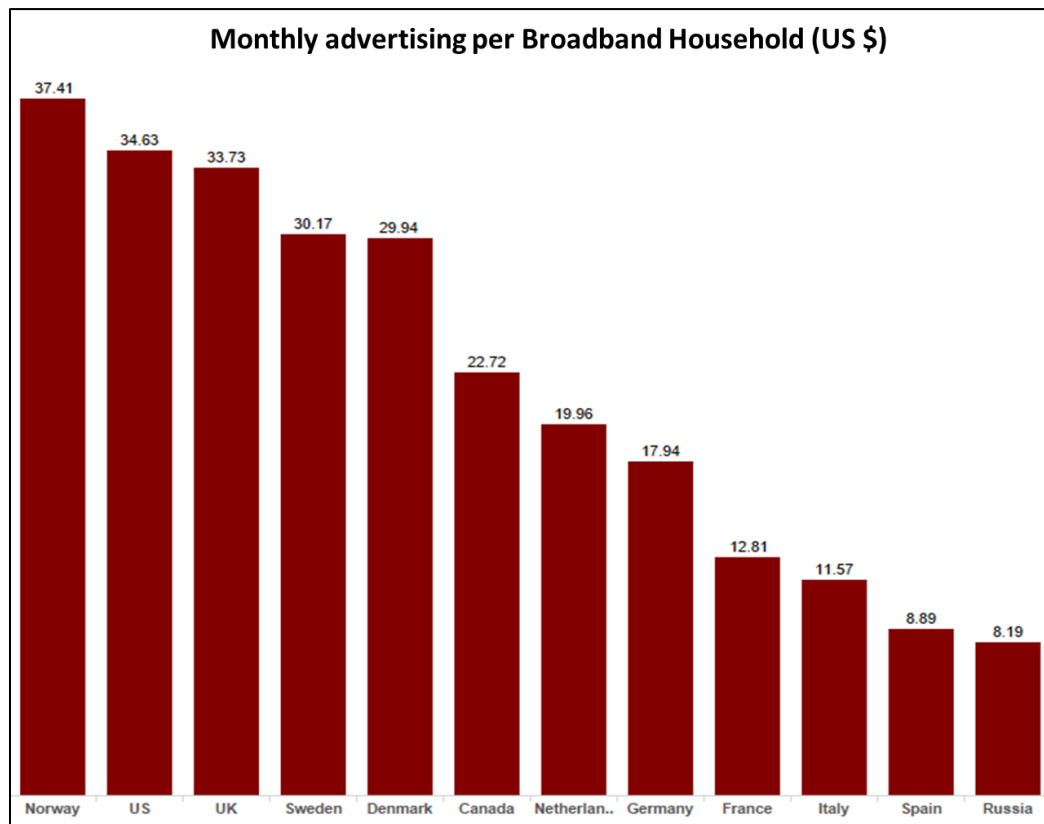
---

<sup>44</sup> Source: [www.digitaltvresearch.com](http://www.digitaltvresearch.com), Last visited January 20<sup>th</sup>, 2014.

## 4. Online Advertising

There is also a big interest in online advertising, especially in mobile. Companies believe that the amount of money spend will increase in the next few years and many companies are making very big investments.

Looking again at table 8 shows that the differences among countries are very big. Figure 21 shows the monthly expenditures per broadband household in online advertising for US, UK, Spain, and some other countries inside Europe.



**Figure 21. Monthly advertising per Broadband Household 2012, different EU countries and US**

Looking at the graph shows very clear differences across different countries. Nordic countries, UK and US are spending more money than France and Germany and much more than Spain and Italy.

So the situation is that inside Europe, there are big differences among different countries. It seems that Nordic countries and UK are the ones that spend more money. There are three reasons to explain that:

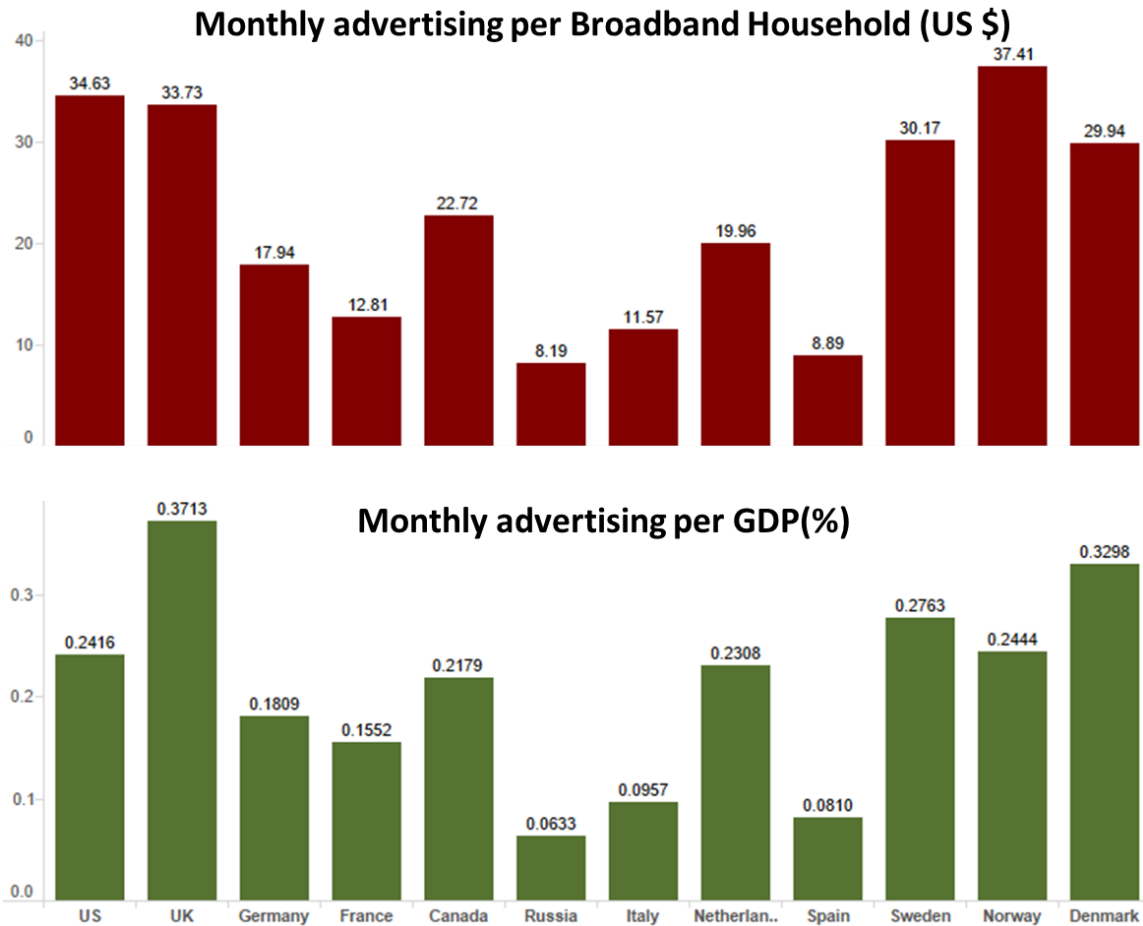
- Countries in the south of Europe are poor compared to the ones in the North and to the US, especially after the global financial crisis of the last few years.
- There are different implementations of the privacy laws in Europe, which leads to a more challenging way to target users in those countries with more strict regulations.
- Different countries are in different levels of Internet maturity.

Regarding the first potential reason, it could be checked looking at GDP data. Figure 22 shows the monthly expenditures per broadband household and per GDP<sup>45</sup>.

---

<sup>45</sup> Source: World Bank



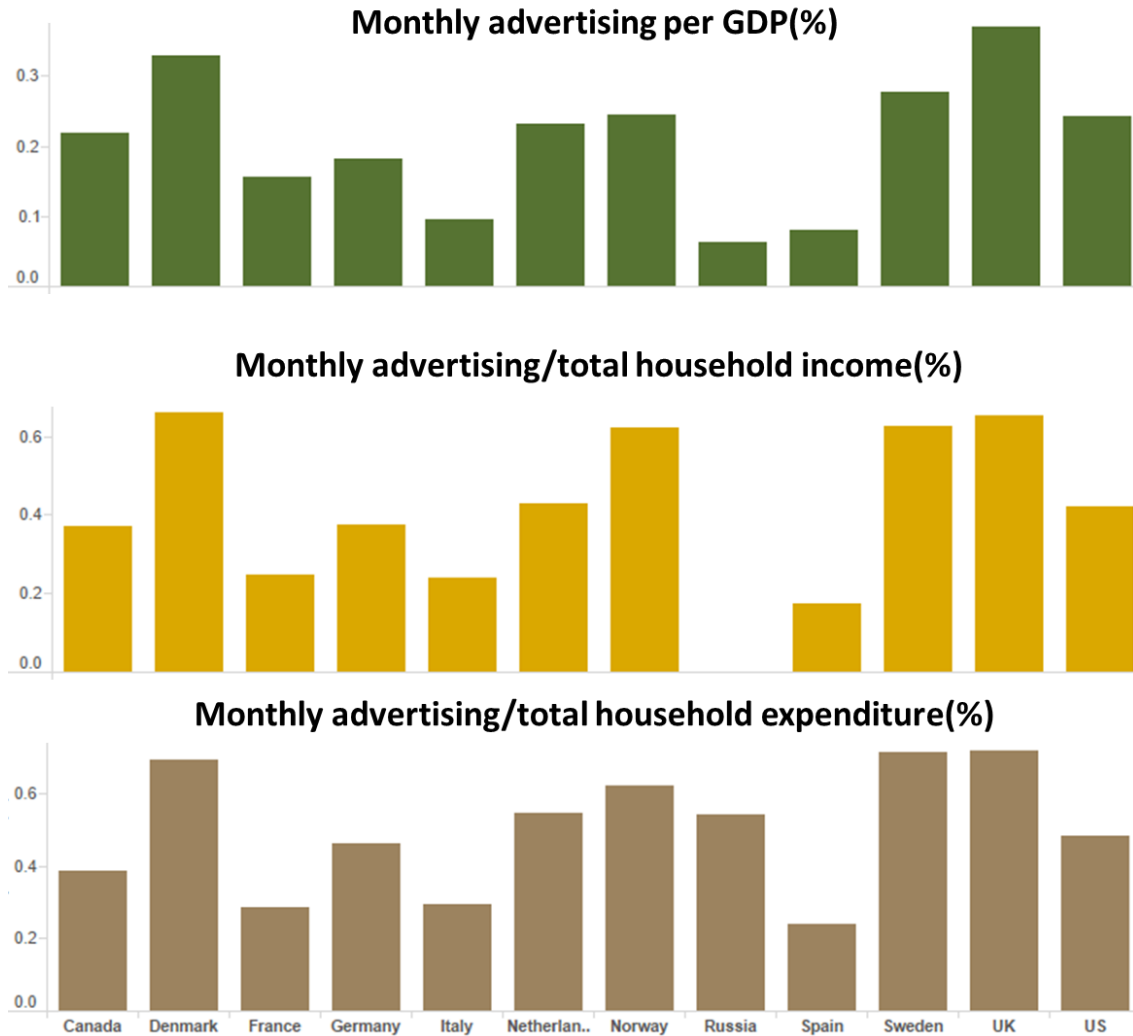


**Figure 22. Online advertising expenditures per broadband household and per GDP, 2012.**

Looking at the figure, there are very different levels of expenditures per GDP and per broadband households in the different countries, but both graphs have very similar patterns. That implies that there is a correlation between GDP and number of broadband households. However, it is still not clear if other factors such as the level of income affect the online advertising expenditures.

Figure 23 shows the monthly expenditures per GDP, by total household income and by total household expenditure, using data from World Bank<sup>46</sup>

<sup>46</sup> Source: <http://data.worldbank.org/indicator/NE.CON.PRVT.CD>, Last visited January 20<sup>th</sup>, 2014.



**Figure 23. Online advertising per GDP, total household income and total household expenditures, year 2012, several countries.**

Looking at the graphs shows that countries with similar consumption and income levels have very different expenditures in online advertising. That implies that the differences among countries are not related to the amount of money that households get and spend.

Therefore, this analysis says that the reason why there are big differences in the expenditures among countries is not because some countries are poorer than others.

The second potential explanation is related to the different implementation of the European privacy laws in the different countries which is related to the fact that online

advertising is much less effective in Europe after the EU privacy laws were passed<sup>47</sup>. And there are in fact many differences in the laws implementation by country.

This could have two different implications:

- In countries with more strict regulations, advertisers will have to pay more to target users.
- In countries with strong privacy laws, users could not be tracked so advertisers would pay much less to place advertising.

Germany is one of the countries with a very high strict implementation<sup>47</sup>. Therefore, it should be expected that the expenditures in Germany will be either very high, to match the first assumption or very low, to match with the second one. However, looking at figure 21 shows that Germany is not one of the top countries in expenditures per broadband households nor it is not one of the countries with lowest expenditures. Therefore, this explanation is not very clear.

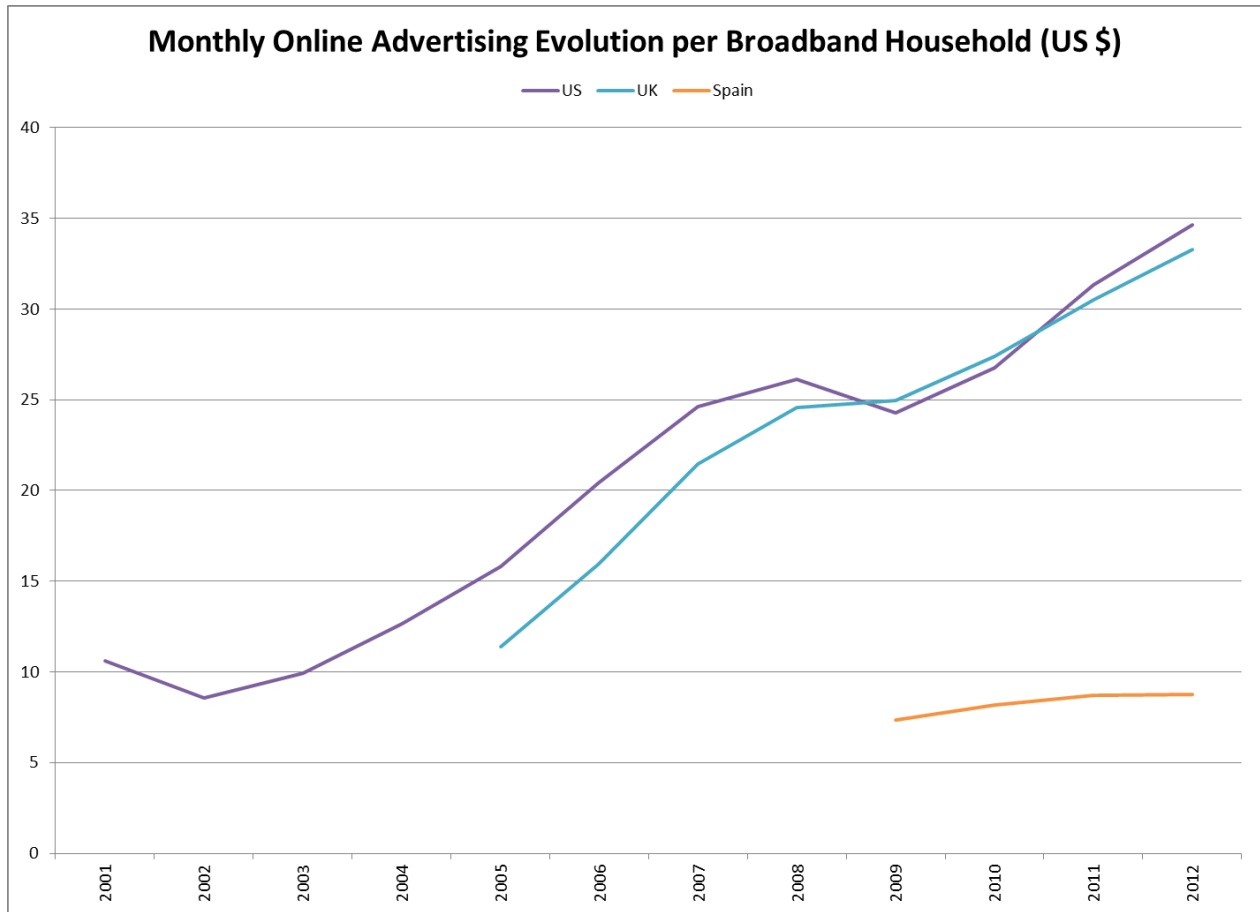
The third potential explanation is related to the level of maturity of each country regarding Internet. According to that, consumers in countries in a more mature Internet level spend more in digital services, ecommerce and are more active on the Internet<sup>48</sup>, which makes them a very interesting target for advertisers.

According to this explanation, a country would need some time to reach a higher maturity Internet level. To check the evolution over the last years, Figure 24 shows the evolution of expenditures for US, UK and Spain. Note that for UK there is only data from 2005 and for Spain from 2009.

---

<sup>47</sup> Goldfarb, A, and C.E Tucker. "Privacy regulation and Online Advertising." 2010.

<sup>48</sup> Pélissié du Rausas, M, J Manyika, E Hazan, J Bughin, M Chui, and R Said. Internet matters: The Net's sweeping impact on growth, jobs and prosperity. McKinsey Global Institute, 2011.



**Figure 24. Monthly online advertising evolution for US, UK and Spain<sup>49</sup>**

Looking at the graph clearly shows that the slope for Spain is much different to the ones for US and UK. Also, the values for US and UK have somehow converged. It seems that online advertising has not taken off in Spain, in terms of expenditures per broadband household and in terms of growth.

The question now is: will the trend in Spain follow the same trend than the one in UK and US? Or more generally: will countries such as Spain catch up with the rest of the countries in terms of Internet maturity?

The answer to this question is tough because of the high number of uncertainties around it, and it is difficult to give a clear answer, but the answer will definitely be related to

<sup>49</sup> Sources: IAB and IAB Europe.

the evolution of mobile advertising, which is supposed to take over in the short term. The reality is that so far this is not true. For example, mobile advertising accounts only for 9% of online advertising expenditures in US and around 9.5% in the UK.

And this is also related to the evolution of the current Internet, where many applications, websites and companies have advertising as one of the main sources of revenues. Therefore, another very interesting question emerges: if mobile advertising does not take off, will companies get the same amount of revenues from digital content and subscriptions than the ones they get from advertising? Will actually there be more money in digital content and subscriptions to digital services than what there is in online advertising?

According to what companies interviewed for this research believe and to the data shown in chapter 2, it seems that the revenues in the future Internet will come from both advertising and subscription fees. It is probable that the role of advertising will be less important, because companies are willing to have revenues from subscriptions fees and consumers are more willing to pay for services. But it seems that advertising will still be important in the next Internet, because companies are really interested. And hence, it is not probable that those who are saying that the future Internet will be based in a content-pay model<sup>50</sup> are right.

## **5. Ecommerce**

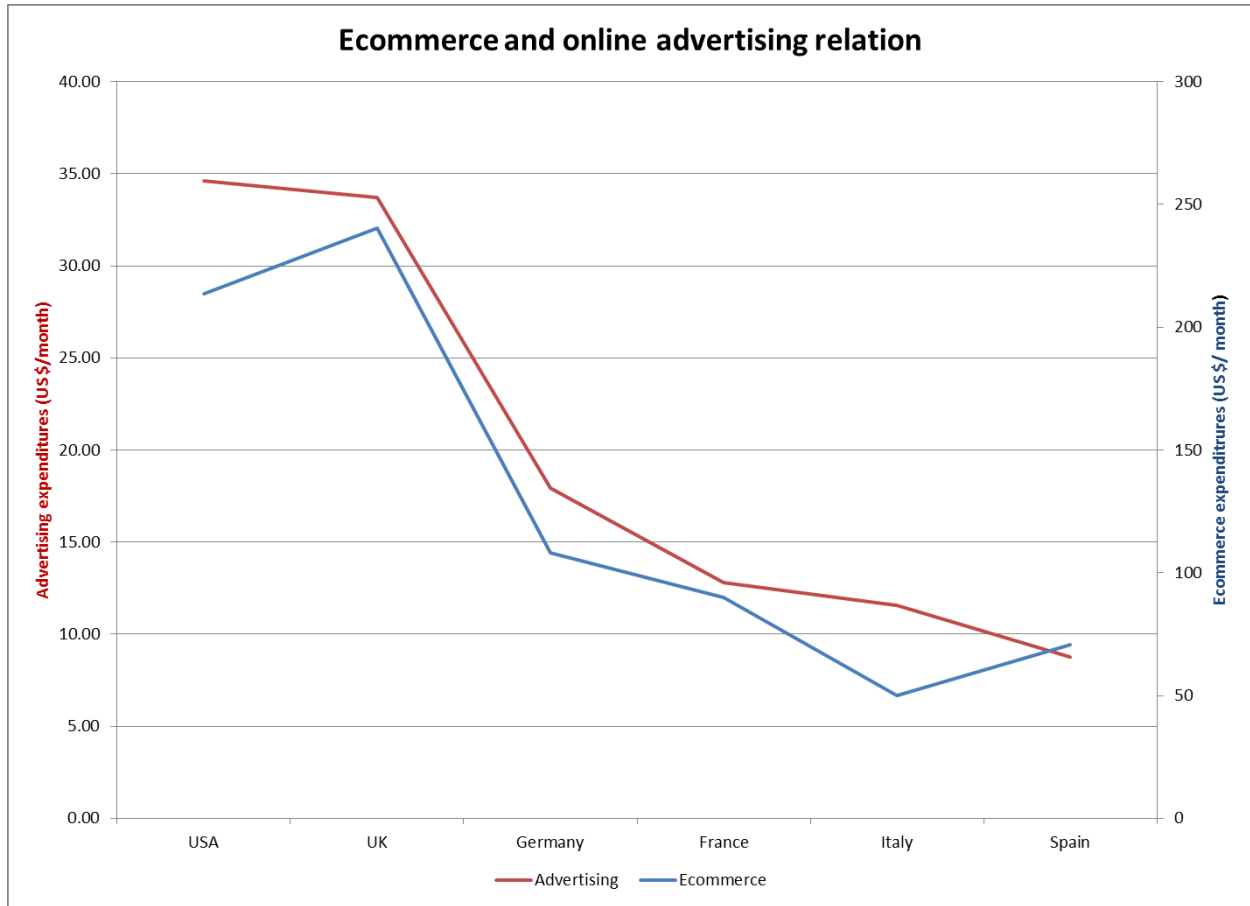
Regarding ecommerce, there is a huge interest in the opportunities around it. Things like mobile payments, social commerce, subscription to digital services, mobile advertising, big data, and human mobility patterns are very interesting for companies.

Looking at the data from table 8 shows that there may be a relation between the amount of money spent in ecommerce per broadband household and the amount of money

---

<sup>50</sup> <http://www.forbes.com/sites/investor/2012/09/13/the-end-of-the-internet-as-we-know-it/>, Last visited January 20<sup>th</sup>, 2014.

spent in online advertising per broadband household. Figure 25 shows this data along with data for Germany, France and Italy<sup>51</sup>.



**Figure 25. Advertising and ecommerce expenditures per household and per country**

The goal to include Germany, France and Italy is to expand the analysis to check that other countries follow the same pattern.

Looking at the graph, it seems clear that there is a correlation between the amount of money spent in online advertising per broadband household in a particular country and the amount of money spent in ecommerce.

<sup>51</sup> Source: emarketer.com.

Therefore, it may be reasonable to think that the level of Internet maturity is also the reason that explains the differences among different countries in ecommerce expenditures. One indicator is the difference in the arrival of big players in the ecommerce sector to the different countries (include reference Amazon arrival Spain).

# Chapter 4 – Business Opportunities

## 1. Introduction

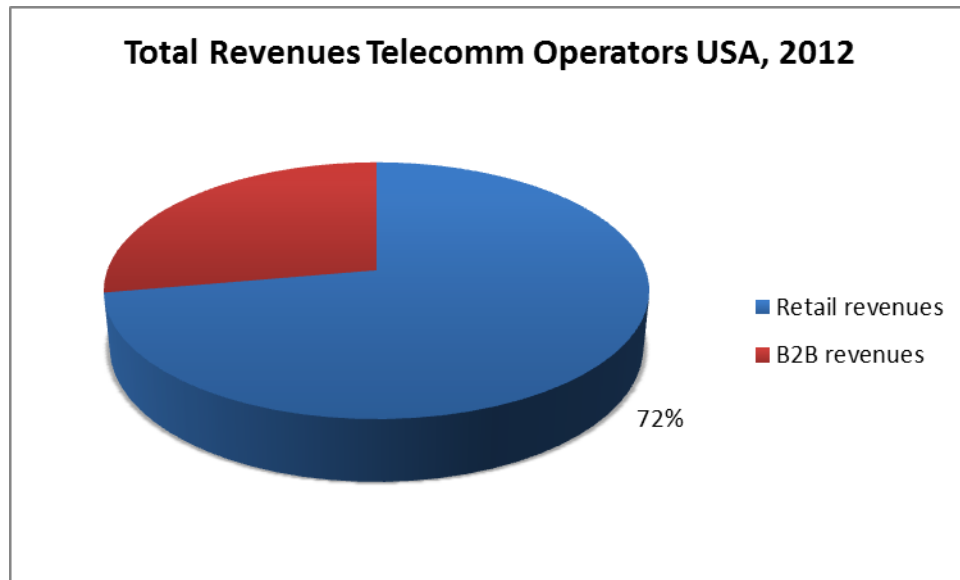
This section provides a set of new business opportunities for telecom operators based on the conclusions from the quantitative analysis and from the interviews. The business opportunities are focused mainly on telecomm operators but many of the business ideas will be also valid for other digital players, since some of them involve the creation of partnerships. The business opportunities defined here will be general, because the analysis made is a macro analysis. However, they will be applicable to most of the companies and they will probably have to be personalized according to the details of the local markets.

Following the same categorization than the one used for the quantitative analysis, business opportunities are grouped in four main categories: ecommerce, video, online advertising and broadband access.

## 2. Methodology

When defining new business opportunities, two levels will be used: strategy level and tactical level. **Strategically**, according to annual reports, to the quantitative analysis and to the insights from interviews, around 70% of the revenues in telcos come from B2C services (wireless and wireline, in order of importance) while 30% come from B2B services (VPN, MPLS, M2M, Cloud Computing, etc). Figure 26 shows the revenue breakdown for US in 2012.





**Figure 26. Retail Revenues telecomm operators US, year 2012.**

Therefore, before defining new business opportunities, it can be said that telcos have two main assets:

1. A very big number of customers (B2C)
2. The network: they own it.

According to this reasoning, three groups of business opportunities can be defined. To formulate the business opportunities the framework *what-how* is used: what they should do and how they should do it. The three groups are:

1. Increase revenues from B2C by increasing loyalty and engagement of users.
2. Increase revenues from B2B by doing a more clever use of the network.
3. Decrease network operating costs by using new tools and technologies.

The analysis done in this thesis is focused exclusively on analyzing how the consumers spend their money. Therefore, only business opportunities related to the first point will be defined.

**Tactically**, telcos have three different options to execute the strategy:

1. Partner with big digital players
2. Partner or acquire small digital players
3. Develop in-house capabilities

These three options are perfectly valid, but over the last years a lot of telcos have failed to develop in-house capabilities to compete with existing players. Sometimes the reasons behind the failure are related to the lack of expertise in the digital world that leads to a very bad user experience, and others the reasons are related to the fact that telcos are slow movers and they usually need a lot of time to create and develop a product. For that reason, the recommendations will be mainly based on partnering with either big or small partners as the best way to grow and to take advantage of the existing business opportunities.

### **3. Business opportunities to increase revenues from B2C**

This section shows the potential actions that telecomm operators could take to increase the number of users or keep it high by increasing user loyalty and engagement. The business opportunities are grouped in four categories: ecommerce, video, online advertising and broadband access.

#### **3.1. Ecommerce**

1. Partner with big digital players to offer **creative bundles**. There are a lot of economic theories that support the increase of sales when two or more services are offered in the same bundle<sup>52</sup>. Since the expenditures in subscription services are growing and users are paying for more services, it is likely that users will be willing to buy services in bundles, especially if the bundles are creative enough to meet their needs. A new entity that manages bundles can emerge and be in charge of managing subscriptions and customer relationships.

---

<sup>52</sup>Bakos, Y and Brynjolfsson, E. "Bundling Information Goods: Pricing, Profits, and Efficiency", 1999.

2. Partnership with network equipment vendors to **accelerate traffic of the financial transactions**, very related to the ecommerce. In some cases<sup>53</sup> users do not finish the purchase of a product or service because of a network problem. By accelerating this traffic, online sellers can be sure that their platforms will be stable enough to not lose sales. This opportunity may have to deal with issues related to the net neutrality in some countries.

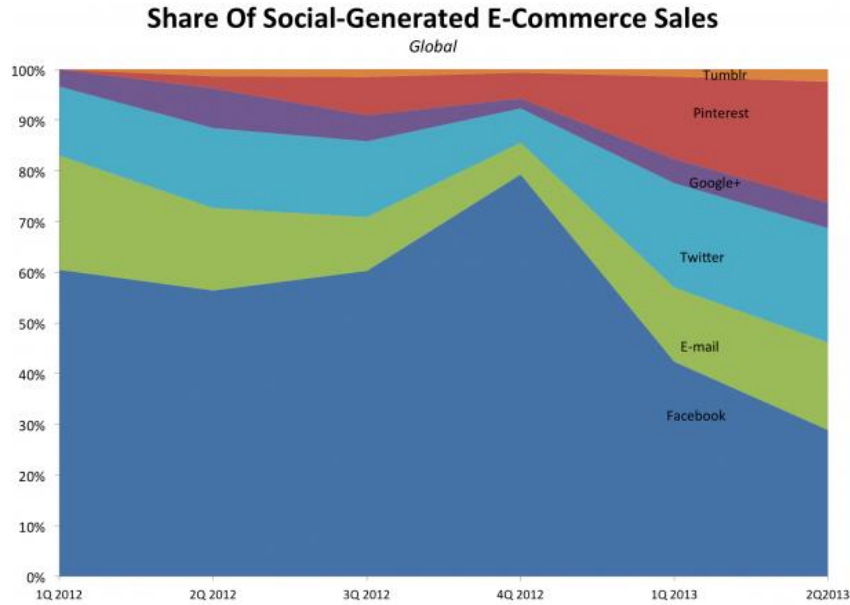
The details of the deal may vary, but an example could be to offer a stable connection to a retailer (which may be more related to B2B), and other example could be charge a fee per transaction, which is more related to B2C.

3. Partner with big digital players to **offer services together, adding some value** to the customers. Examples of added value are a lower price for the consumer than if acquired independently or a better customer support. Some examples could be:
  - a. Partner with WhatsApp in Spain, where it has more than 20 million users, one of the countries with highest penetration.
  - b. Partner with Pinterest, which has more than 49 million users<sup>54</sup> and it is becoming a very important player in the social ecommerce, becoming one the most influential social network, see Figure 27.

---

<sup>53</sup> <http://econsultancy.com/blog/11274-67-of-consumers-cite-slow-websites-as-the-main-cause-of-basket-abandonment> , Last visited January 20<sup>th</sup>, 2014.

<sup>54</sup> [http://semioCast.com/en/publications/2013\\_07\\_10\\_Pinterest\\_has\\_70\\_million\\_users](http://semioCast.com/en/publications/2013_07_10_Pinterest_has_70_million_users), Last visited January 20<sup>th</sup>, 2014.



**Figure 27. Share of social commerce Sales<sup>55</sup>**

Details of the deals may vary, but some examples could be:

- Pre-installation of the application in the terminal.
- Free data traffic for this particular application in metered data plans.
- Free access to the application for a period of time.

By offering this set of joint services, telecomm operators can differentiate from the competitors using their partners' powerful brands, and decrease the customer churn. This action will be especially well suited in mature markets, where big players are already established.

This type of partnerships will be very interesting for the digital players too, as they will have access to a very high number of customers which will help them to increase their revenues too.

<sup>55</sup> Source: Business Insider: [http://www.businessinsider.com/the-rise-of-social-commerce-2013-10?nr\\_email\\_referer=1](http://www.businessinsider.com/the-rise-of-social-commerce-2013-10?nr_email_referer=1), Last visited January 20<sup>th</sup>, 2014.

4. Partner with small Internet companies to come up with new disruptive mobile apps. One example would be to create the **dominant application or method for mobile payments**, making use of telecom operator assets. For example, the fact that they have a very large number of customers makes easier to offer some sort of financial services, such as for example a single bill at the end of month, including both the telecom services and the things consumers purchase in their daily activities.

Regulation could be a barrier for entry in some markets, and fierce competition from banks may be a reality. Probably, including financial institutions in this kind of partnership is a good idea.

### **3.2. Video**

1. Again, partnering with big digital players to **offer services together, adding some value** to the customers could be a good idea for video services. Netflix in US could be a good partner, since it has more than 30 million customers. This strategy will be totally different to what telecomm operators are doing right now, since they see Netflix as a competitor. However, by redefining the portfolio of video services they are offering now and by matching it to what users really value, a global commercial offer including Netflix and telecomm operators could be offered to the customers.
2. Partner or acquire a small OTT video streaming company or Real Time video company to offer video over the Internet in markets where big players such as Netflix or Skype are not well established

The idea would be to increase the internal assets and capabilities of the company and **offer a whole set of services to the customers in emerging markets**. In this type of market billing is critical since a significant portion of the population is unbanked and there is less competition from big players.

3. Partner with big data companies to **understand the amount of data** telecomm operators have. They usually are not able to analyze how customers use their services because they do not have the know-how.

By partnering with big data companies, valuable information could be extracted from the data and could be used for things such as product development processes or to redesign market efforts according to customer behavior. This last option would be especially important, because better marketing campaigns could be defined which could help either to gain video customers from competitors or to avoid customer churn.

### **3.3. Online Advertising**

1. Partner with mobile advertising companies to **use valuable data from telecomm operators** (e.g. location information) to track users and come up with an innovative solution.

The main problem with mobile advertising now is that there is no a good way to track what users do in their smartphone. In laptops, cookies are used to monitor the users, but cookies are very limited in mobile<sup>56</sup>: third-party cookies are either not allowed or very easy to deactivate in browsers such as Safari, Internet Explorer, Firefox and Google Chrome.

There are huge potential opportunities because the smartphone is a very personal device, unlike sometimes the laptop, but opportunities are still waiting.

The key point to create the right application here is to bring advertisers onboard, showing them that a new method really works. Therefore, companies are trying to

---

<sup>56</sup> Cookies on Mobile 101. Understanding the limitations of cookie-based tracking for mobile advertising. IAB, November 2013

come up with innovative solutions to create the best way to track users. The problem is that the mobile advertising sector is very fragmented and there are very different solutions. These solutions are based on:

- The device and/or the Operating System (OS): Apple IDFA<sup>57</sup> and Google<sup>58</sup>.
- New algorithms: Big data analytics companies and some telcos are trying to develop algorithms to track the users, regardless of the device and Operating System. Some big data companies say that they can target audiences by combining the IP address with other data from websites and apps.
- The Mobile Application: some apps can monitor what users do as long as they are logged in. Google and Facebook already know some things about tracking users while they are signed into their Google or Facebook accounts. The problem comes when the users log out and with users that do not have a Google or Facebook account.

The reality is that no one of the described methods has become the universally adopted method yet. However, before a standard solution is accepted some players such as Facebook are bringing advertisers on board with its advertising solution. Figure 28 shows the increase in Facebook's mobile advertising revenue in the last year.

---

<sup>57</sup> <http://www.businessinsider.com/apples-idfa-and-ifa-tracking-system-2013-6>, Last visited January 20<sup>th</sup>, 2014.

<sup>58</sup> <http://spectrum.ieee.org/tech-talk/telecom/internet/googles-adid-aims-to-replace-cookies-for-tracking-web-users>, Last visited January 20<sup>th</sup>, 2014.

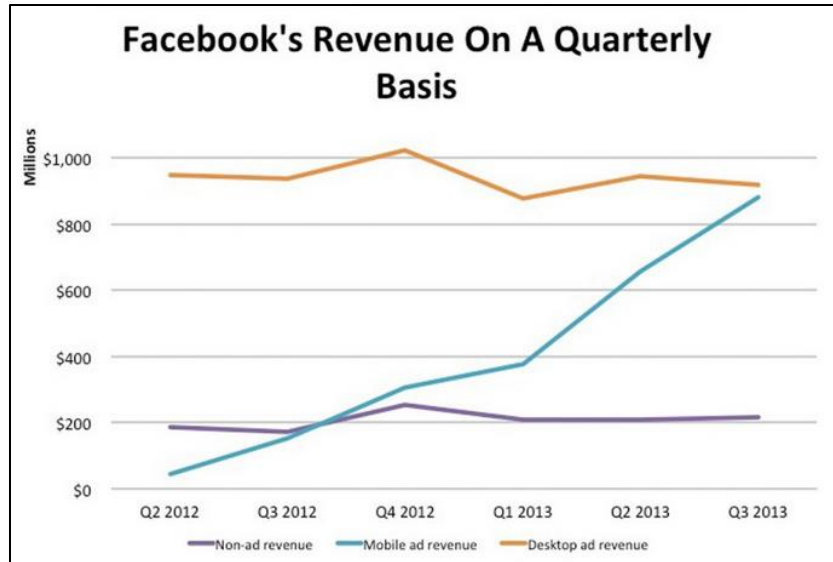


Figure 28. Facebook's revenue on a quarterly basis<sup>59</sup>

Looking at the graph shows that Facebook is now getting more or less the same money from mobile advertising than from desktop advertising. And more important, this data confirms that advertisers are very willing to spend money on the right solution. The key point is to come up with the standard solution.

### 3.4. Broadband access

1. Again, partner big data companies may help to **get very interesting information from the huge amount of data** telecom operators have. It would be especially interesting to use this information to redesign marketing efforts, which could be used to earn new customers and to avoid customer churn both for wireless and wireline broadband accesses.
2. Partner with digital players to **increase the footprint or upgrade the capacity** of the network. This idea is working very well in developing countries (Facebook

<sup>59</sup> Source: Business Insider: <http://www.businessinsider.com/half-of-facebooks-revenue-now-comes-from-mobile-advertising-2013-10>, Last visited January 20<sup>th</sup>, 2014.



internet.org<sup>60</sup> and Google Free Zone<sup>61</sup> initiatives are good examples), but it will be hard to implement in mature markets, because of the net neutrality issue and the bargaining problems between telcos and digital players.

---

<sup>60</sup> <http://internet.org/>, Last visited January 20<sup>th</sup>, 2014.

<sup>61</sup> <http://www.google.com.ph/intl/en/mobile/landing/freezone/>, Last visited January 20<sup>th</sup>, 2014.

## Chapter 5 – Conclusions

As a summary of the main finding of this thesis, the main conclusions are:

- There are very big differences in expenditures by consumers in the services and products related to the Internet ecosystem in US, UK and Spain.
- Wireline Broadband both fixed and wireless is more expensive in US than in UK and in Spain. In the wireline segment, the reason may be related to different levels of competition, while in the wireless segment the differences could be explained by different levels of deployment of new technologies.
- There is still a significant amount of money in wireline broadband.
- Video expenditures per broadband household in the US are higher than in UK and Spain, probably because the Pay TV penetration is higher.
- There is money in online advertising, but not as much as in other services such as wireless services, video services or ecommerce. In some conversations with carriers, they express their frustration when bargaining with some Internet players, because they believe Internet players should pay them for being connected, since they are getting all the money for advertising. Speculating that carriers could have 5% of the advertising revenues in the US, they would get \$1.7 per month, which is not a big deal and could probably be easily obtained by other means.
- There is a correlation between expenditures in ecommerce and in online advertising per country.
- There are big differences in ecommerce and online advertising among countries. Countries in the north of Europe and US are spending much more than countries in

the south of Europe, which may be related to the different levels of Internet maturity in each country.

- There are some interesting opportunities for telecomm operators in ecommerce, video services, online advertising and broadband access to increase revenue from B2C. Most of the new opportunities involve the creation of partnerships with digital players in win-win strategies.

## Chapter 6 – Future Work

To complement the work done in this thesis, the next actions could be done:

- Do a deep analysis to check the reasons that explain the differences in expenditures in wireless and wireline services. A detailed analysis of competition levels could be done to understand the differences in wireline broadband and a detailed analysis of infrastructures and technologies would help to understand differences in wireless broadband.
- Expand the analysis to other countries or parts of the world, to see the differences in expenditures by consumers. Adding more countries in Europe could be a good idea, but also emerging markets could be interesting. Asia is probably one of the most interesting targets because of the growth rates in the last few years but also emerging countries in South America can be interesting for the potential opportunities for companies.
- Analyze the details of expenditures in ecommerce to find out what detailed things users spend their money in. Some examples can be restaurants, clothing and electronics.
- Complement the analysis done in this thesis for how consumers spend their money with data from consumer behavior to detect not only what they buy but also what they are interested in.
- Go into the details of mobile advertising and see what type of mobile advertising is working better and why (displays before showing content, banners and discount based advertising are some examples).

# Appendix A –Interviews

More than forty interviews were conducted to check the opinions of the different companies about this research. Companies include telecom operators, cable operators, OTT video providers, online advertising companies, big data companies, online payment companies, content delivery networks, ecommerce companies, equipment manufacturers, media companies and consulting companies in US, UK and Spain.

## 1. Structure of the interviews

Some of the interviews were formal and other informal but in all of them three different types of questions were asked:

- Quantitative Analysis questions: One main goal of the interviews was to check the opinions about the quantitative analysis. Questions were asked in two different areas:
  - Differences in expenditures in wireline and wireless services among countries in Europe and countries in the US, focusing on:
    - Wireless service and wireline broadband and voice services.
    - Video services.
  - Differences in expenditures in ecommerce and online advertising per country. Two important questions were raised here:
    - The first one about if there is any other revenue model for the Internet ecosystem, apart from the one based on advertising.
    - The second one based on the situation of mobile advertising, and about the interest of different companies in its takeoff.
  
- Industry trends inquiries: Once the opinion about the quantitative analysis was checked, questions about the current interests and actions of the different companies were asked. Follow up questions were asked to see if there was any relation with the findings of this thesis.

- Business Opportunities evaluation: Finally, the viability of some initial business opportunities was checked and also several new business possibilities were explored with the interviewees.

## 2. Summary of the interviews.

Due to the variety of the companies that were interviewed, the opinions were in some cases very different, which enriched the analysis and gave a very global view of the industry trends. Next tables show the summary of the number of answers to the most important questions.

	Better service in the US	Less competition in the US	Other	N/A	Total answers
Reason to explain differences in wireline broadband	7	19	4	13	43

	Better service in the US	Less competition in the US	More data consumption in the US	Other	N/A	Total answers
Reason to explain differences in wireless	15	9	6	3	10	43

	More Pay TV Penetration in the US	Content more expensive in the US	Other	N/A	Total answers
Reason to explain differences in video services	22	7	4	10	43

	Different levels of Internet maturity	Different regulations	Other	N/A	Total answers
Reason to explain differences in online advertising	21	12	2	8	43

	Different levels of Internet maturity	Different regulations	Other	N/A	Total answers
Reason to explain differences in ecommerce	23	8	4	8	43

	Ecommerce	Video	Infrastructure (Broadband access)	Online Advertising	Other	Total answers
Best business opportunities for telecomm operators	16	12	4	6	5	43

	Advertising based	Subscription fee based	Mixed	Other	N/A	Total answers
Future model of the Internet	5	5	25	0	8	43

