Belgisch Instituut voor
postdiensten en telecommunicatie

Mededeling van de Raad van het BIPT van 14 april 2020 betreffende het rapport van Capgemini Invent van maart 2020 aangaande de evolutie van mobiele data in het Belgisch spectrum voor publieke mobiele diensten en de impact ervan op het media-aandeel

Context

De Belgische mobiele netwerkoperatoren beschikken over hun eigen radiotoegangsnetwerk en spectrumvergunningen. Ze hebben elk drie technologieën uitgerold: 2G, 3G en 4G. Het bijgevoegde onderzoek betreft deze netwerken en hun evolutie. Via hun respectieve mobiele netwerken vervoeren operatoren dataverkeer van en naar de eindgebruiker.

Het BIPT is van plan om de komende jaren een grote hoeveelheid spectrum voor mobiele diensten te gunnen, alsook om vergunningen te verlengen. Het nieuwe spectrum zou kunnen worden gebruikt voor 4G- en/of 5G-technologieën. Spectrum binnen 700, 1400 en 3600 MHz wordt geïdentificeerd als nieuw spectrum. Bijkomend wordt ook overwogen om de 26GHz-band open te stellen.
Gelet op de regels inzake verdeling van bevoegdheden in België, zijn de gemeenschappen verantwoordelijk voor de wezenlijke en technische aspecten van audiovisuele mediadiensten (bijzondere wet van 8 augustus 1980 tot hervorming der instellingen, art. 4, 6°). De andere vormen van elektronische communicatie vallen onder de bevoegdheid van de Federale Staat.

Het BIPT deed een beroep op een onafhankelijke consultant om het media-aandeel in de mobiele data op een objectieve wijze te bepalen, hetgeen kan dienen als onderhandelingsbasis voor de verdeling van de komende 5G-spectruminkomsten tussen de federale overheid en de gemeenschapsoverheden.

Deze studie werd uitgevoerd door Capgemini Invent en resulteerde in het rapport "*Evolution of mobile data in the Belgian mobile licensed spectrum and the impact on media presence*" (Evolutie van mobiele data in het Belgische spectrum voor publieke mobiele diensten en de impact ervan op het media-aandeel) van maart 2020. Het BIPT publiceert hierbij dat rapport.

Deze studie, gevraagd aan het BIPT door de minister van Telecom, dhr. Philippe De Backer, bepaalt het totale datavolume en het media-aandeel daarin, zowel in termen van volume als van inkomsten die eruit voortvloeien. De studie kijkt zowel naar de huidige situatie als naar de toekomst, rekening houdende met eventuele technologische ontwikkelingen (zoals 5G-applicaties), over een tijdspanne van 20 jaar.

Om de aanwezigheid van media in het totale volume van en inkomsten uit mobiele data te bepalen, werden twee benaderingen toegepast. Benadering 1, die beschouwd moet worden als de meer striktere kijk op wat media zijn, en benadering 2, die een ruimere kijk op media hanteert.

	Benadering 1	Benadering 2
1. een dienst zijn	Economisch	Economisch en Niet-economisch
2. redactionele verantwoordelijkheid	Ja	Nee
3. hoofddoel	Ja	Nee
4. levering van audiovisuele programma's	Ja	Ja
5. ter informatie, vermaak of educatie	Ja	Ja
6. voor het algemene publiek	Ja	Ja
7. door middel van elektronische-communicatienetwerken	Ja	Ja

Samenvatting interpretatie van media benadering 1 tgov. benadering 2

Resultaten van de studie

Op basis van het model werd het gewogen gemiddelde percentage van media in het totale volume van mobiele data in de loop van de tijd (2019 tot 2040) bepaald op 4,94% in Benadering 1 (AVMD-richtlijn) en op 17,79% in Benadering 2 (Media-NRI's).

Op basis van het model werd het gewogen gemiddelde percentage van mobiele inkomsten die toegerekend kunnen worden aan media in de loop van de tijd (2019 tot 2040) bepaald op 7,94% in Benadering 1 (AVMD-richtlijn) en op 28,20% in Benadering 2 (Media-NRI's).

	Media presence in Mobile data 2019-2040	
	Based on: Volumes	Based on: Revenues
Approach 1 AVMS-Dir.	4,94%	7,94%
Approach 2 Media NRAs	17,79%	28,20%

Samenvatting van het media-aandeel in de volumes van en inkomsten uit mobiele data

Bijlage

Het rapport is hierna hernomen.

Axel Desmedt
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Jack Hamande
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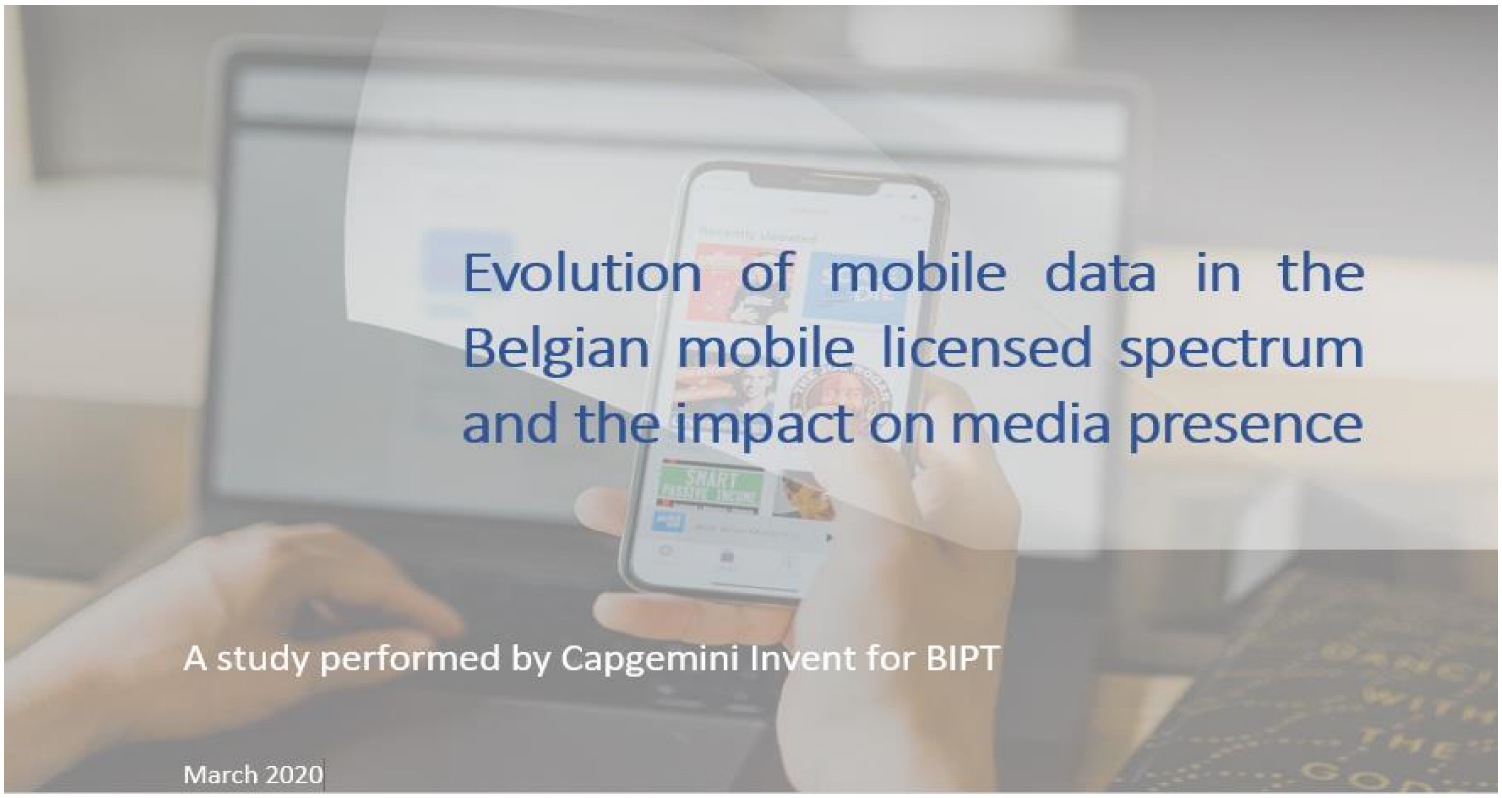

Evolution of mobile data in the Belgian mobile licensed spectrum and the impact on media presence

A study performed by Capgemini Invent for BIPT

March 2020

Capgemini invent

EXECUTIVE SUMMARY

The main purpose of this study is to provide an objective and quantified view on the presence of media content in the Belgian mobile data traffic over the next 20 years. As this approach required an in-depth analysis of the mobile data traffic, this study also identifies the evolution of the mobile data traffic and the challenges and opportunities that lay ahead for the different players in the telecom ecosystem - that itself will drastically evolve in the next years. 5G will bring new features and applications that have the potential to create a mobile business platform that generates new revenues, efficiency gain and added value for suppliers and business customers.

The model, for the calculation of the mobile data volumes and related revenues, has been constructed on two different pillars: Individuals and Objects. Individuals reflects the current and future mobile data traffic generated by means of a personnel device and mobile subscription for private or professional purpose. Within Individuals all traffic is generated by (inter)actions of a person. As such this pillar is representing the vast majority of the current mobile data traffic. Objects is incorporating all mobile data traffic generated without direct personal action in a machine-to-machine or IoT-like setting. The Object pillar is at this moment a minor fraction of the total mobile data traffic but will evolve strongly in the next years.

For **Individuals,** the usage of the mobile device has been tagged in one of the following service categories: Social Media, Browsing, Messaging, Video Streaming, Gaming, Maps & Navigation, Email, Audio Streaming, Cloud Storage, App Store & updates and Offline. The total mobile connected time, that was identified based upon the daily time usage and the related daily usage of mobile devices, has been divided over these categories. In addition, per service category an average throughput has been identified. The evolution of all these parameters has been forecasted, resulting in a forecasted volume of mobile data per category over the next 20 years.

Offload from fixed to Mobile network (via Wi-Fi), Fixed wireless Access (replacing the fixed connection with a mobile connection) and the transition to Voice over LTE have a decisive impact on the mobile data usage. The offload from the mobile to the fixed network (via Wi-Fi) has been measured at 74% and is assumed to remain stable over time as several conditions that impact the offload are likely to offset each other. Although we do not see a large market for FWA in Belgium, the traffic generated within this category will increase over the years and will represent in 2040 up to 15% of the Mobile data traffic in the Individuals pillar. Between now and 2034 all voice traffic will gradually be replaced by VoLTE. Due to the low throughput, the VoLTE volume are almost neglectable, but we do consider them because of the impact on the revenues.

Within the individual parts the yearly data volume increases from 323Mio GB in 2019 to 3,35Bio GB in 2040, representing a monthly average data usage that increases from 3,3 GB in 2019 to 22,2 GB in 2040.

To determine the revenues in the Individual model, tariffs and evolutions of it have been determined for the different Data usage, being the standard mobile data usage, FWA and VoLTE. Based on input from the operators, the standard mobile tariff has been set at €5,49 in 2019. We foresee that operators

are aiming at stable revenues over the years, resulting over the period from 2019 to 2040 in an average monthly revenue per user around €25. The price decrease over the years, to €1/GB in 2039 is compensated by the boost of data volumes.

As Fixed Wireless Access is an alternative for the wireline access, the price setting is determined by the fixed access tariffs. Based on international benchmarks a mark-up of 400% is set on top of the current fixed tariff, resulting in a tariff above the fixed tariffs but well below the current mobile data tariff. Over time this tariff will also follow the same trend as the standard mobile data tariff.

To determine the VoLTE tariff, the current tariff for a voice call per minute has been transposed towards a tariff per GB, resulting in a price of €88/GB. Due to the technology shift from traditional voice to VoLTE and the competitive pressure from alternative solutions this mark-up will decline over the years towards the standard mobile data tariff.

The mobile data revenues are forecasted to remain stable at approximately €3,75Bio per year. To accomplish this level of revenues, the operators are facing multiple challenges as they need to compensate the loss of revenues of traditional voice with revenues of mobile data. The mobile data revenues will also be under high pressure as mobile data will become a commodity. Therefore, a key prerequisite will be to identify new features, services and content that ensures added value on mobile data.

The **Objects** pillar of the model is largely determined by the potential of 5G to unlock (new) business applications via the wireless networks. More than hundred use cases have been analysed in the following verticals such as Automotive, Energy & Utilities, Manufacturing & Warehouses, Smart Cities, transportation, Broadcasting & Entertainment, Agriculture, Logistics, Healthcare, Data transport and Retail. Use cases with a potential high number of objects and/or throughput via cellular networks have been withheld and are used to determine and forecast the mobile data usage per vertical.

Over a period of 20 years the total mobile data volume of Objects increases from an annual volume of less than 2Mio GB to 10Bio GB. Verticals generating the highest data volumes are Automotive, due to the introduction of automated guided vehicles, Manufacturing & Warehousing, especially by Smart factory implementations and Smart Cities, in which numerous monitoring- and video-applications will be implemented. The implementations of mobile business applications start from 2020 but only as of 2025 a significant increase of volumes is forecasted.

The revenues generated by the Object pillar are based on Mobile data tariffs per vertical. 5G will bring new features and possibilities on the mobile networks. Lower latency, higher speed, more connection potential per m^2, private and tailored networks and guaranteed QoS and SLA's represent the new benefits for the companies. Research has shown that customers are willing to pay for these benefits. A specific tariff per vertical has been determined by combining the standard mobile tariff for the Objects model, that is much lower than the Individuals standard mobile tariff, with a specific mark-up per vertical. These specific mark-ups have been set by identifying the most relevant features per vertical and the willingness to pay for these.

Because different tariffs have been applied by vertical, the impact has also shifted slightly but the main verticals that generate Mobile Revenue are still Manufacturing, Smart Cities and Automotive. In parallel with the Volumes the significant take up of the Mobile Data revenues also starts as of 2025.

With a CAGR of 40% the potential revenues are well-above €4Bio/year in 2040. The business development potential of 5G and related technologies is for operators, in comparison with the Revenue evolution of Individuals, clearly to be found in in the Objects pillar.

Combining the Individuals and the Objects pillar, the model shows an average annual growth of 19% in volumes, with significant increases of volumes in both pillars. For Revenues, we see an overall average annual growth of 4%, that completely can be attributed to the Object pillar. Operators will have to divide their focus on the one hand on maintaining their current revenues streams in Individuals and on the other hand on developing new business in the Objects pillar. Suppliers of content, applications and services built upon the mobile network and its new features have an important business development potential in both pillars. However, this is not quantified in this model.

A first step to determine the presence of media in the total volume and revenues of mobile data was to clearly to define Media. The concept of media should be understood within the meaning of Article 4(6) of the Special Law of August 8, 1980 on the reform of the institutions. The concept of 'audiovisual media service' should be interpreted in the light of the AVMS Directive. Based on this, media services have been identified in the first place by withholding the (content) providers which are registered at y the Media NRAs. Secondly, the interpretation of the AVMS directive has been applied. Different interpretations are given to the AVMS directive. Therefore, as it was not the intent of this study to intervene in the regulatory discussion on what can be considered as Media, we have opted to apply two approaches. An approach 1, that should be considered as the more restricted view on what is Media, and an approach 2 that applies a broader view on Media.

	Approach 1	Approach 2
1. be a service	Economical	Economical and Non-economical
2. editorial responsibility	Yes	No
3. principal purpose	Yes	No
4. provision of audio-visual programmes	Yes	Yes
5. in order to inform, educate or entertain	Yes	Yes
6. to the general public	Yes	Yes
7. via electronic communications networks	Yes	Yes

Summary media interpretation approach 1 vs. approach 2

To apply these rules in the Individuals pillar of the model, the media percentage per service category and per approach (to identify media) has been identified. This has been done by analysing the main media channels and platforms (such as Facebook, Instagram, YouTube,…).

Based on Operator data, YouTube content consists for 100% out of video. It is assumed that all content offered via YouTube is public content. This implies that for approach 2, 100% of YouTube is considered Media. To determine the media presence complying with the rules of approach 1, an analysis has been

performed on the trending daily top 200 videos over a period of 1 month. The result of this analysis is that for approach 1, 10,4% of the YouTube content can be considered as Media.

Using the same methodology for Facebook, results in a current ratio video/non-video of 30/70 and private accounts for 54% of all traffic. The media presence on the different platforms will be influenced by an increase of video content, an increased need for more privacy and thrusted content. Taking into account these parameters the Media presence on Facebook evolves for approach 1 from 1,38% in 2019 up to 5% in 2040. For approach 2 the media presence increases from 13,5% to 25%.

The same methodology used for Instagram shows that Media under approach 1 remains stable at 5% and for approach 2 decline from 50% to 43%. Media on Pinterest represent currently 39% for approach 2, increasing over 20 years to 85%, and for approach 1 the percentage is increasing from 4% to 8,5%.

The results of these analyses have been extrapolated to similar platforms. Inserting these conclusions in the relevant service categories results in the following media presence per service category:

	Approach 1		Approach 2	
	2019	2040	2019	2040
Social media	2,6%	5,2%	30,2%	36,6%
Browsing	3,3%	4,1%	22,7%	57,9%
Video streaming	38,2%	38,2%	98,8%	98,8%
Audio streaming	93,20%	93,20%	99,90%	99,90%

In the service categories, Messaging, Gaming, Maps & Navigation, Email, Cloud Storage, App Store & Updates and Offline there is no media content identified for both approaches.

Within the Object pillar, we haven't identified any significant Media presence. Only electronic billboards generate a minor volume of Media under approach 2.

For the Individual Pillar, we have identified a media presence in the Mobile data Volume of 13,2% in 2019 that evolves to 14,5% in 2040 for approach 1, and of 43,7% to 51,7% for approach 2. For Revenues these figures evolve over a period of 20 years for approach 1 from 6,69% to 14,5% and for approach 2 from 43,1% to 51,7%.

The figures of the Individual pillar are diluted when combining these with the volumes and revenues of the Object pillar of the model as only a neglectable amount of media is present within Objects. Mobile data Volumes and Revenues of the Objects are increasing over time and will overtake the numbers from the Individual pillar.

In total, the weighted average percentage of Media in the total mobile data Volumes if for approach 1, 4,9% and for approach 2, 17,8%. Within the mobile data Revenues, the weighted average percentage of Media is 7,9% for approach 1 and 28,2% for approach 2.

Contents

1. INTRODUCTION

1.1 BIPT tender & purpose

The Belgian mobile network operators have their own radio access network and spectrum licensing. They each rolled out three technologies: 2G, 3G and 4G. The research relates to these networks and their evolution. Through their respective mobile networks, operators convey data traffic to and from the end user.

BIPT plans to award a large amount of spectrum for mobile services in the next years, including license renewals. The new spectrum could be used for 4G and/or 5G technologies. Spectrum within 700, 1400 and 3600 MHz are identified as new spectrum. In addition, also the 26GHz band is under consideration to be opened up.

The purpose of this study is to provide an objective basis to determine the repartition of the revenues, generated by the upcoming spectrum auctions, between the federal and community governments. Considering the rules on division of competence in Belgium, communities are responsible for the substantive and technical aspects of audiovisual media services (special law of August 8th, 1980 to reform institutions, Art. 4, 6°). The other forms of electronic communications fall within the competence of the Federal State.

This study, requested to the BIPT by the minister of telecom Mr. Philippe De Backer, determines the total mobile data volume and media usage in it and this both in terms of volume, as well as the income generated from it. This both in accordance with the current situation, and in a forward-looking perspective, taking into account possible technological evolution (such as 5G applications), within a time frame of 20 years. As the purpose of this study is to determine how the revenues from the spectrum auction could be distributed over the different federal and community governments, all services used over mobile networks have been considered to calculate the revenues generated by this spectrum. This implies that for the revenue part both mobile data and voice traffic have been taken into account to determine the occupation ratio of the spectrum by audiovisual media services.

By examining the mobile data evolution in Belgium over the next 20 years, this study also reveals the challenges and opportunities that the different actors of the eco-system are facing. The current operators will not only have to secure their current revenue streams, but also have to address new segments and levels in the value chain to valorize the investments in new technologies. At the same moment, new opportunities will be unlocked for new players on the market. This study is only focusing on the potential value of the spectrum for operators, which is only a part of the total value that will be created as other players such as equipment providers, content providers, IT-companies and the industry as a whole can develop added value on top of the available mobile network infrastructure. While performing this study, the uptake of services as forecasted in Europe and worldwide, had to be revised and delayed, to match the reality on the Belgian market. As such, we see an important challenge for the government and the industry to ensure that the Belgian economy, and all potential players in the Mobile data value chain, can benefit from these new opportunities. The total value that this represents is much higher than the potential revenues from the spectrum auction or the revenues generated by the operators.

1.2 Approach of the study

For this study, we have developed a model to obtain a baseline of data conveyed via licensed spectrum in Belgium. The model is constructed out of 2 pillars being 'Individuals' and 'Objects'. 'Individuals' being all data usage that can be linked to exchange of mobile data using one or more personal mobile devices and, 'Objects', the mobile communications without a direct human interface or interaction.

The forecasting model is constructed on the baseline model taking into account trends and evolutions in the use of mobile data and media consumption via mobile data. The majority of the current Mobile data usage can be found in the Individual pillar. To determine the evolution of this pillar user behavior and technological evolution have been combined. The Object pillar is at this moment only starting up, but will, due to the new features that 5G brings to mobile data usage, evolve strongly over the next years. To assess the growth in the Objects pillar multiple use cases in the main industrial verticals have been analyzed. Evolutions of volume and revenues are different within these pillars and will be highlighted.

To determine the media presence in mobile data a general methodology has been developed. As different interpretations exist on what can be considered as Media, we have, while using our methodology, investigated two approaches that can be considered as the minimum and maximum presence of media content.

The report is structured in the following manner:

Chapter 2. Scope: Provide a clear view on the scope of the study to clarify the outer limits of the study.

Chapter 3. General approach: Provide a high-level view on the applied methodology and approach of this study.

Chapter 4. Media definition: Provide an explanation on the media definitions and the methodology.

Chapter 5. Volume: Explain the approach to determine the total mobile data volume.

Chapter 6. Revenues: Elaborate on the revenues related to total mobile data usage.

Chapter 7. Identification of Media: Explain the way of working to determine the media presence in mobile content.

Chapter 8. Conclusion: Providing the results of the analysis.

2. SCOPE

To build a well-structured and clear project approach, the different elements of the study have been identified and defined. Although the result of the study will report exclusively on mobile data, other elements, such as fixed data volume and offload, are also considered.

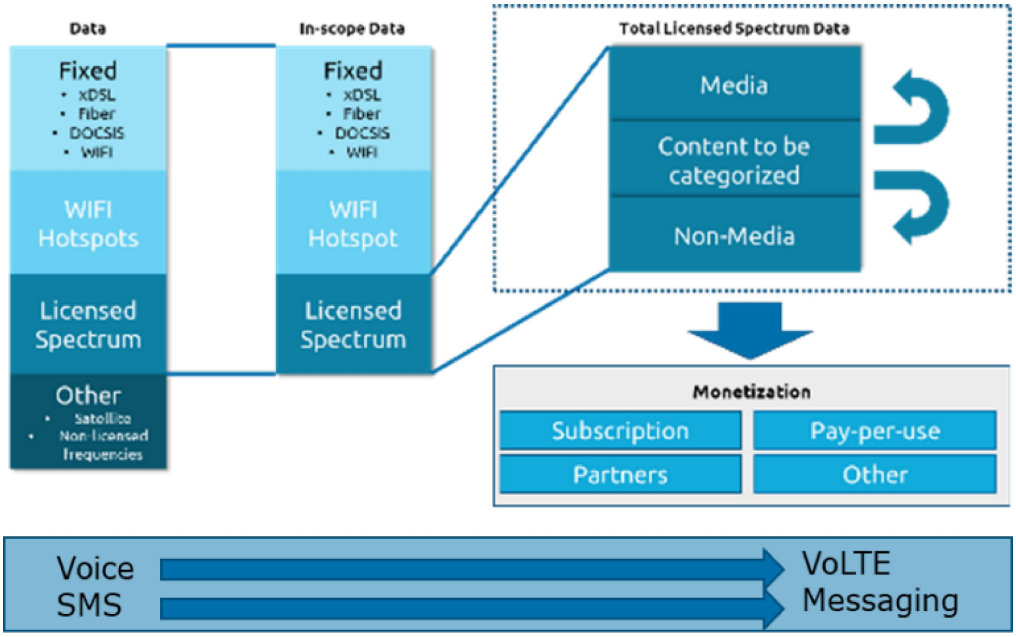

Figure 1: Scope definition

2.1 Period

The new mobile spectrum will be assigned for a period of 20 years. Therefore, a view on the evolution of data traffic over this period is necessary. The study takes the actual situation of 2019 as starting point and forecasts over the next 20 years, until 2040.

2.2 Licensed mobile data volume

The complete data usage can be divided in data being conveyed via fixed networks, via mobile licensed spectrum and via other means such as satellites and unlicensed spectrum. The scope of this project is limited to determining and forecasting data transmitted via licensed spectrum. However, in order to come to a correct view on the mobile traffic evolution and to accurately assess impacts of fixed offloading and mobile substitution effects, the volumes and revenues of data conveyed via fixed networks have also been analysed.

In this report, '**Fixed Data**' refers to all national data traffic (incl. both up- and download) in Belgium that is conveyed over a fixed network technology. The traffic captured via Wi-Fi networks (hotspot or from individual users) is also considered as fixed data. '**Mobile Data**' refers to all national cellular mobile data traffic (incl. both up- and download) in Belgium, including both B2C, B2B and wholesale traffic on a licensed spectrum. International users roaming in Belgium are included and Belgian users roaming abroad are excluded in this definition.

'Fixed Offloading' refers to the potential mobile cellular data traffic of end-users on a cellular enabled device which is replaced by using a fixed connection instead (e.g. via Wi-Fi at home). 'Mobile Substitution' refers to the potential fixed data traffic which is replaced by end-users using a mobile cellular connection instead (e.g. xDSL replaced with 4G/5G).

This study is looking into the mobile data of the operators where 'Operators' are the Mobile Network Operators (MNO) who are currently, or in the future, possessing licensed spectrum. The traffic of the MVNOs is included in the mobile data volume as their traffic is also conveyed via the spectrum of one of the MNO's.

Data conveyed over satellite and via non-licensed spectrum will not be investigated in this study as we do not expect that these technologies will exercise a decisive impact on the Belgian market, now and in the future.

2.3 Mobile Revenues

The 'revenues' which are considered in this study are those generated by the MNOs that can directly be linked to data usage. These revenues include the subscription-based revenues, in which a part can be attributed to data usage comprised in a bundled offer, and the usage-based revenues meaning data usage outside bundles that is mostly billed via a pay-per-use model. In this approach features such as service level agreement (SLA), quality of service (QoS), etc… are included. Revenues that can be attributed to devices, set-up costs or premium content (for example a subscription to Netflix) are excluded from the scope of this study as these are the result of specific marketing strategies.

The revenues related to mobile voice and SMS are also taken into account, as these services also use the mobile spectrum.

2.4 Mobile Segments

All mobile segments are included in the study: B2C, B2B as well as wholesale. While B2C is considered as the retail customer segment of operators, the B2B segment encompasses business and professional customers. Wholesale, on the other hand, covers data volumes and revenues generated by MVNOs and international roaming users in Belgium. All these segments are considered as all of them generate mobile data volume as well as mobile revenue on the licensed spectrum.

2.5 Media

In accordance with the BIPT tender, the concept of media should be understood within the meaning of Article 4(6) of the Special Law of 8 August 1980 on the reform of the institutions.

The concept of 'audiovisual media service' should be interpreted in the light of Directive (EU) 2018/1808 of the European Parliament and of the Council of 14 November 2018 amending Directive 2010/13/EU on the coordination of certain provisions laid down by law, regulation or administrative action in Member States concerning the provision of audiovisual media services (Audiovisual Media Services Directive) in view of changing market realities (hereinafter the AVMS Directive). In order to determine whether a service is considered as media, several conditions must be met cumulatively:

1. that it is a service;
2. that the service is under the editorial responsibility of a media service provider;
3. that its principal purpose is the provision of audiovisual content;
4. that the purpose is to provide television (or audio) programmes;
5. that the purpose of the programmes is to inform, entertain or educate;
6. that the targeted audience of the programmes is the general public;
7. that the programmes are delivered via electronic communications networks.

The concept of 'audio media services' is not defined by European law. In order to be aligned with the Belgian regulatory framework, the radio broadcaster, in the common sense of the word, whether it is listened in a linear way (broadcasting) or in a non-linear way *(*podcasting*),* is also in the scope of this study.

Based on a consultation of the media regulators in Belgium (CSA, Medienrat and VRM), an alternative approach for the definition of media has been included in the scope of this study.

3. GENERAL APPROACH

3.1 Overview

The general approach used for this study consists out of three key tracks, namely:

1. Media Definition
2. Analytics
3. Forecast Modelling

As can be seen below, each track consists out of a series of activities, which results in a baseline and a forecast for:

- Total Mobile Data Volume
- Percentage of Media in Mobile Data Volume
- Total Mobile Revenues
- Percentage of Media in Mobile Revenues

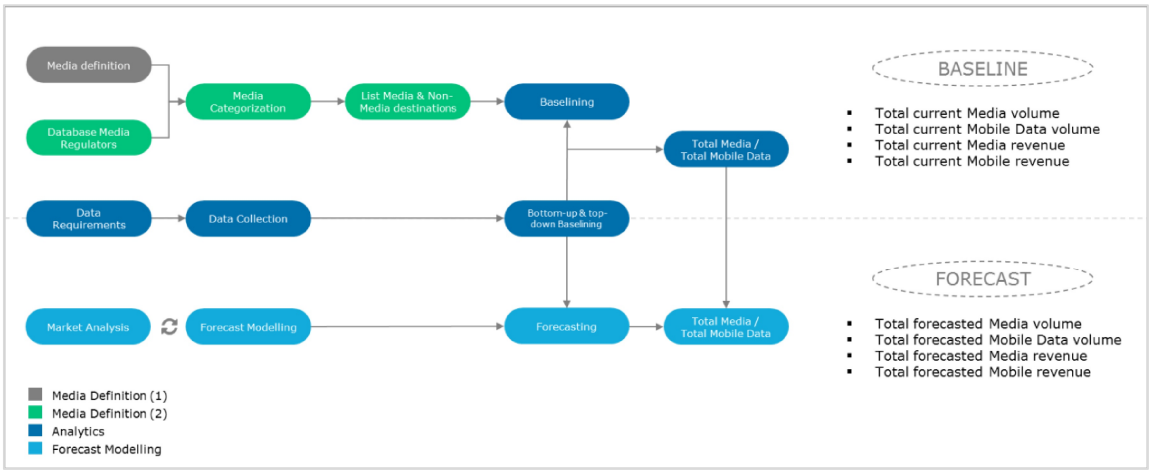

Figure 2: Overview study approach

In the Media Definition track, the first step was to identify and agree on a consolidated definition of what is understood by 'Media'. Once achieved, the analysis of multiple regulatory related data sources led to a complete list of Media & Non-Media destinations. In turn, this was used as a framework to analyse the received baselining data.

The Analytics track started with defining the data requirements from the key sources (Regulators, Operators, market research and usage behaviour) and resulted into the data collection process. The input received in the data collection process was based on actual data, supplemented with forecasts to feed both the baselining and forecasting part of the study.

With the Forecast Modelling track, an initial model was created based on market research as well as internal expertise. Based on the available/collected data as well as ongoing discussions, the model has been refined and optimised iteratively.

The combination of these tracks resulted in the forecasting model, starting from a solid baseline from several key sources.

3.2 Key sources

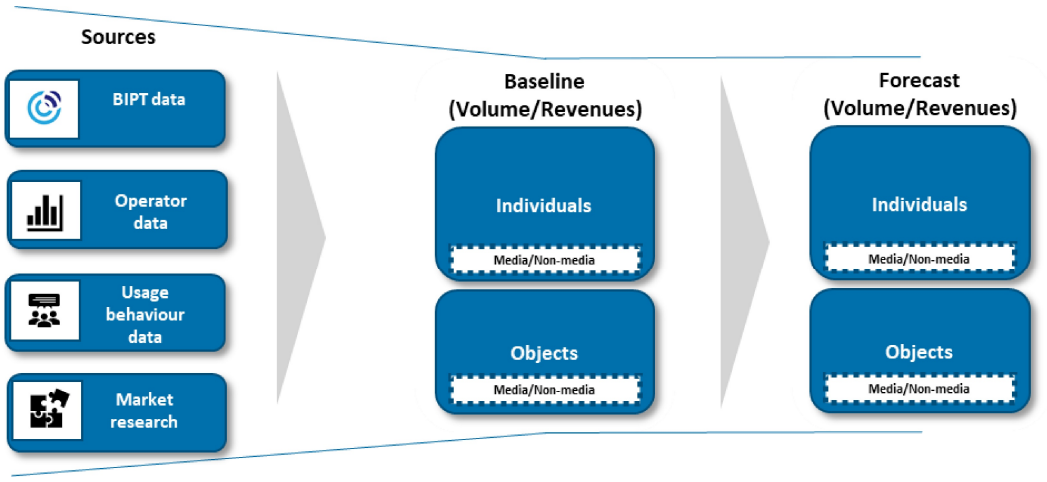

Figure 3: Key sources

Based on research on the demand- and the supply side, in combination with in-depth analysis of existing reports, interviews with several parties[1] in the eco-system and Capgemini Invent's knowledge database both on a national and international level, a considerable amount of data has been gathered to build a baseline model and develop a forecasting model.

3.2.1 BIPT data

BIPT has provided aggregated historical data on volume and revenue of mobile traffic enabling to define a baseline and trends. In addition, BIPT has provided input on timing for roll-out and phasing out of technologies, high-level market evolutions and possible key drivers for mobile data traffic.

The media NRAs have also been invited to provide input for the study.

[1] Equipment providers and vendors, operators, industrial organisations, Capgemini Invent market Unit leaders,…

3.2.2 Operator data

On the supply side the MNOs, Proximus, Orange and Telenet, have been contacted to provide relevant data on volume, revenues and evolutions of mobile data traffic, resulting in the following data requirements:

1. User consumption data on consumed data volumes per customer type, tariff plan and related invoiced amounts;
2. An overview of data protocols to obtain a view on mobile data consumption via the different protocols;
3. Media protocols in order to come to aggregated information on consumed mobile data of potential media services;
4. Information on mobile data volumes of specific media services, such as Netflix, YouTube, Pickx, …;
5. A geographic breakdown of the consumed data volume based on the location of the antenna stations;
6. High level data on throughput, revenues and fixed data volumes

The provided data were aggregated using either Excel or Anatella (ETL-tool) in such a way that the original source of the data (the specific operator) could no longer be identified. Only aggregated results were included in presentations to BIPT and in the final report.

3.2.3 Usage behaviour data

IMEC - Mobile DNA

Considering "what people say, is not always what people do", IMEC was contacted regarding their Mobile DNA[2] initiative to collect additional data on end-users' smartphone behaviour. Mobile DNA is an application which can be installed by end-users and tracks smartphone usage throughout the day, providing insight into both duration (i.e. connected time) as well as which applications are used by end-users. The received sample size was 6,350 and consisted of end-users who logged at least 22 days during 2019. Based on this dataset, as well as a limited Mobile DNA meta-dataset with socio-demographic information, strong and detailed insights were gained into daily usage of end-users.

Profacts - User Survey

A quantitative survey was created and pushed online among Profacts' research panel. The purpose of the study was to measure how and when users consume mobile data on their mobile phones. Additionally, the outcome provided insights on the time spent on mobile data versus Wi-fi as well as the drivers and barriers behind the users' choice. The collected data helped to interpret the data found

[2] Ghent University (n.d) *Mobile DNA - Application that shows your smartphone usage.* https://www.ugent.be/mict/en/research/mobiledna.htm

throughout the desk research as well as the data received from the operators and IMEC. Furthermore, the questionnaire permitted to quantify data that could not be found in other sources. The sample of 1,200 respondents ensured a statistical strong representation of the Belgian population aged between 16-80 while keeping equally sized segments for Flanders, Wallonia and Brussels[3].

3.2.4 Market research

Equipment suppliers and vendors of equipment on the Belgian market (Ericsson, Nokia, Huawei, Cisco, Samsung, MCS, etc.) have been contacted and contributed useful input to this study.

This study is built on the extensive knowledge database of Capgemini Invent on the telecom market and more specifically on 5G. A worldwide study on 5G in industrial operations[4] and a study together with Agoria focusing on Belgium industrial 5G opportunities[5] have been used for modelling purposes.

In addition, an extensive desk research based on expert reports and internet content has been done to complete the data set needed to build the baseline and forecasting model.

[3] Detailed results in appendix 1: User survey
[4] Capgemini Research Institute (April 2019), '5G in industrial operations: How telcos and industrial companies stand to benefit'.
[5] Capgemini Invent Belgium & Agoria (November 2019), 'Time to connect Belgium with 5G, an exhaustive industrial study reveals roadblocks and opportunities'.

4. MEDIA DEFINITION

4.1 Definition of what is 'Media'

4.1.1 Legal definition

BIPT has requested to identify the proportion of media in the total mobile data. Whereas the concept of media should be understood within the meaning of Article 4(6) of the Special Law of August 8, 1980 on the reform of the institutions. The concept of 'audiovisual media service' should be interpreted in the light of the AVMS Directive (see section 3.6).

The legal definition of an audiovisual media service is provided by Article 1.1.A of the AVMS Directive:

(i) a service as defined by Articles 56 and 57 of the Treaty on the Functioning of the European Union, where the principal purpose of the service or a dissociable section thereof is devoted to providing programmes, under the editorial responsibility of a media service provider, to the general public, in order to inform, entertain or educate, by means of electronic communications networks within the meaning of point (a) of Article 2 of Directive 2002/21/EC; such an audiovisual media service is either a television broadcast as defined in point (e) of this paragraph or an on-demand audiovisual media service as defined in point (g) of this paragraph;

(ii) audiovisual commercial communication.[6]

This definition has been transposed as follows in Belgium:

Flemish Community

Decree of the Flemish Community (Article 2 26°) :

Omroepdienst: a) een dienst als vermeld in [artikel 56 en 57 van het Verdrag betreffende de werking van de Europese Unie], die valt onder de redactionele verantwoordelijkheid van de aanbieder van de dienst, met als hoofddoel de levering aan het algemene publiek van audiovisuele of auditieve programma's ter informatie, vermaak, educatie of met culturele inslag, via elektronische communicatienetwerken; en/of b) de commerciële communicatie.[7]

[6] Eur-Lex (December 2018), *Directive 2010/13/EU of the European Parliament and of the Council of 10 March 2010 on the coordination of certain provisions laid down by law, regulation or administrative action in Member States concerning the provision of audiovisual media services (Audiovisual Media Services Directive)*. https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32010L0013

[7] Vlaamse Regulator Media, (ay 2019), *Mobile DNA - Application that shows your smartphone usage*. https://www.vlaamseregulatormedia.be/sites/default/files/mediadecreet_27_maart_2009_17.pdf

French-speaking Community

Decree of the French-speaking Community (Article 1 48°) :

- Un service relevant de la responsabilité éditoriale d'un éditeur de services, dont l'objet principal est la communication au public de programmes télévisuels ou sonores par des réseaux de communications électroniques, dans le but d'informer, de divertir et d'éduquer ou dans le but d'assurer une communication commerciale.[8]

German-speaking Community

Decree of the German-speaking Community (Article 2.2.3) :

- Eine Dienstleistung im Sinne der Artikel 49 und 50 des EG-Vertrags, für die ein audiovisueller Mediendiensteanbieter die redaktionelle Verantwortung trägt und deren Hauptzweck die Bereitstellung von televisuellen oder auditiven Sendungen zur Information, Unterhaltung oder Bildung der allgemeinen Öffentlichkeit über elektronische Kommunikationsnetze ist. Bei diesen audiovisuellen Mediendiensten handelt es sich entweder um lineare oder nichtlineare televisuelle oder auditive Mediendienste und/oder um die audiovisuelle kommerzielle Kommunikation.[9]

Brussels-Capital Region

Law on Audiovisual Media in Brussels-Capital Region (Article 3 5°):

- (NL) een dienst die valt onder de redactionele verantwoordelijkheid van een aanbieder van audiovisuele mediadiensten, met als hoofddoel de levering, via elektronische-communicatienetwerken, aan het algemene publiek van programma's ter informatie, vermaak of educatie, of met het oog op een audiovisuele commerciële communicatie.

- (FR) un service relevant de la responsabilité éditoriale d'un fournisseur de services de médias audiovisuels, dont l'objet principal est la fourniture de programmes par des réseaux de communications électroniques, dans le but d'informer, de divertir et d'éduquer le grand public ou dans le but d'assurer une communication commerciale audiovisuelle.[10]

The Belgian constitutional concept of "audiovisual media service" (which falls under the competence of the Communities) possibly also encompasses audiovisual media activities of a non-economic nature such as for example community (non-profit) media, therefore extending beyond the concept of audiovisual media services as defined by the AVMS Directive. Indeed, the Flemish and the French-speaking Communities do regulate such activities to a certain extent.

[8] CSA (August 2018), *Décret coordonné sur les services de médias audiovisuels.* http://csa.be/documents/2882

[9] Medianrat (March 2017), "*Dekret über die audiovisuellen Mediendienste und die Kinovorstellungen*. http://medienrat.be/files/Dekret_27_Juni_2005_Stand_28_Maerz_2017.pdf

[10] Etaamb (May 2017), *Loi relative aux services de médias audiovisuels en région bilingue de Bruxelles-Capitale*. https://www.etaamb.be/fr/loi-du-05-mai-2017_n2017040323.html

4.1.2 Media definition as proposed by BIPT based on CSA guideline (approach 1)

BIPT has requested to categorize the audiovisual content in mobile data as media based on the AVMS Directive and the recommendation adopted by the CSA in 2012 [11]. Hereunder we provide a short summary of the guidelines to be applied according to this recommendation[12]. The following conditions must be met cumulatively:

1. Be a **service**

The definition of service refers to Article 57 of the TFEU that states:

Services shall be considered to be "services" within the meaning of the Treaties where they are normally provided for remuneration, in so far as they are not governed by the provisions relating to freedom of movement for goods, capital and persons.

"Services" shall in particular include: (a) activities of an industrial character; (b) activities of a commercial character; (c) activities of craftsmen; (d) activities of the professions.[13]

Recital 21 of the AVMS Directive (from 2010) stresses that the scope of the Directive "should be limited to services as defined by the Treaty on the Functioning of the European Union and therefore should cover any form of economic activity, including that of public service enterprises, but should not cover activities which are primarily non-economic and which are not in competition with television broadcasting, such as private websites and services consisting of the provision or distribution of audiovisual content generated by private users for the purposes of sharing and exchange within communities of interest". With this interpretation, only content that has an economic purpose can be withheld as media. Putting a family video online is, under this interpretation of the definition, not regarded as offering an economic service and is thus not considered as media.

2. Be under the **editorial responsibility** of a media service provider

Editorial responsibility is defined by Article 1.1.c of the AVMS Directive as "the exercise of effective control both over the selection of the programmes and over their organization either in a chronological schedule, in the case of television broadcasts, or in a catalogue, in the case of on-demand audiovisual media services".

Recital 25 of the AVMS Directive (from 2010) adds that "the concept of editorial responsibility is essential for defining the role of the media service provider and therefore for the definition of audiovisual media services".

In fact, this implies that forwarding a message of another source such as forwarding a video-extract from the RTBF-news via YouTube or Instagram for instance, is not representing an editorial responsibility and excludes this forward from being media content. On the other hand, in case RTBF

[11] CSA (March 2012), *Recommandation relative au périmètre de la régulation des services de médias audiovisuels*. http://www.csa.be/documents/1713

[12] Appendix 2 : CSA interpretation of the AVMS directive

[13] Eur-Lex (October 2012), *Consolidated version of the Treaty on the Functioning of the European Union,* https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:12012E/TXT

has put the extract itself on a platform, this extract will be considered as media as RTBF has an editorial responsibility.

3. The **principal purpose** is the provision of audiovisual content

Recital 22 of the AVMSD Directive (from 2010) explains that the definition of an audiovisual media service "should exclude all services the principal purpose of which is not the provision of programmes, i.e. where any audiovisual content is merely incidental to the service and not its principal purpose. Examples include websites that contain audiovisual elements only in an ancillary manner, such as animated graphical elements, short advertising spots or information related to a product or non-audiovisual service".

Recital 3 of the AVMS Directive (from 2018) further explains that the Directive "should remain applicable only to those services the principal purpose of which is the provision of programmes in order to inform, entertain or educate. The principal purpose requirement should also be considered to be met if the service has audiovisual content and form which are dissociable from the main activity of the service provider, such as stand-alone parts of online newspapers featuring audiovisual programmes or user-generated videos where those parts can be considered dissociable from their main activity. A service should be considered to be merely an indissociable complement to the main activity as a result of the links between the audiovisual offer and the main activity such as providing news in written form. As such, channels or any other audiovisual services under the editorial responsibility of a provider can constitute audiovisual media services in themselves, even if they are offered on a video-sharing platform which is characterised by the absence of editorial responsibility. In such cases, it will fall to the providers with editorial responsibility to comply with Directive 2010/13/EU".

This means that video or sound put online via the website of a journal or newsmagazine is not to be considered as media, because the primary purpose is providing written news, but that a specific and clearly dissociable section of that website could be considered as such, on a case-by-case basis.

4. The purpose is to **provide television (or audio) programmes**

A programme is defined by Article 1.1.b of the AVMS Directive as "a set of moving images with or without sound constituting an individual item, irrespective of its length, within a schedule or a catalogue established by a media service provider, including feature-length films, video clips, sports events, situation comedies, documentaries, children's programmes and original drama".

Recital 23 of the AVMS Directive (from 2010) adds that "the term 'audiovisual' should refer to moving images with or without sound, thus including silent films but not covering audio transmission or radio services. While the principal purpose of an audiovisual media service is the provision of programmes, the definition of such a service should also cover text-based content which accompanies programmes, such as subtitling services and electronic programme guides. Stand-alone text-based services should not fall within the scope of this Directive".

A programme can be a television service but also, in the Belgian context, an audio service.

5. The purpose of the programmes is to **inform, entertain or educate**

   Recital 22 of the AVMS Directive (from 2010) details that "the definition of an audiovisual media service should cover mass media in their function to inform, entertain and educate the general public, and should include audiovisual commercial communication".

The AVMS Directive does not provide any guidance on the definition of these concepts. It is generally considered that "they are so vague and general that they can apply to virtually any type of audiovisual content"[14].

6. The targeted audience of the programmes is the **general public**

Recital 21 of the AVMS Directive (from 2010) states that "the definition of an audiovisual media service should cover only audiovisual media services, whether television broadcasting or on- demand, which are mass media, that is, which are intended for reception by, and which could have a clear impact on, a significant proportion of the general public" while recital 22 states that it "should exclude any form of private correspondence, such as e-mails sent to a limited number of recipients".

The content to be considered as media has to be addressed to the general public, excluding all forms of private communications or confidentiality.

All private communication or videos shared in a closed user group are to be considered private and are thus not withheld as media.

7. The programmes are delivered via **electronic communications networks**

To be a media service, the program must be delivered through electronic communication networks.

An electronic communications network is defined by Article 2 (a) of the Directive 2002/21/EC as "transmission systems and, where applicable, switching or routing equipment and other resources which permit the conveyance of signals by wire, by radio, by optical or by other electromagnetic means, including satellite networks, fixed (circuit- and packet-switched, including Internet) and mobile terrestrial networks, electricity cable systems, to the extent that they are used for the purpose of transmitting signals, networks used for radio and television broadcasting, and cable television networks, irrespective of the type of information conveyed".

4.1.3 Media definition VRM, CSA, Medienrat (Approach 2)

For this study, the different media regulators have also been contacted and feedback has been requested on the interpretation on how media should be identified and categorized. As a result, VRM, CSA and Medienrat have introduced a joint document on the applicable parameters to identify media services[15].

[14] Cabrera Blázquez F.J., Cappello M., Fontaine G., Valais S., On-demand services and the material scope of the AVMSD, IRIS Plus, European Audiovisual Observatory, Strasbourg, 2016, p. 24.
[15] Appendix 3: CSA, VRM, Medienrat media approach

The media authorities have proposed a broader definition and approach. It also covers services and activities that fall within the constitutional concept of "audiovisual and audio media services" but are not included in the European definition of "audiovisual media services" referred to in Article 1.1.a of the AVMS Directive, including:

- Non-economic broadcasting activities, which are not services within the meaning of Articles 56 and 57 of the treaty on the Functioning of the European, such as non-profit radios Union;
- video-sharing platform services, which are since 2018 governed by the AVMS Directive, but separately from audiovisual media services;

VRM, CSA and the Medienrat claim that they are also competent for non-economic services, while, apart for the granting of frequencies to the non-profit radios, this is not reflected in their legal framework (with the exception of the Flemish Community):

Decree of the Flemish Community (Article 2 25°):

Omroepactiviteit: Elke activiteit die bestaat in het ter beschikking stellen van bewegende beelden, al dan niet met geluid, of van een reeks van klanken of geluiden bestemd voor het algemeen publiek of een deel ervan via elektronische communicatienetwerken. Omroepactiviteit wordt ook wel radio-omroep en televisie genoemd.

The media NRAs have provided a description, including some Media examples according to their approach:

Type of services	**Examples**	**Included in the European concept of audiovisual media service**
Linear audiovisual media services	RTBF La Une Eén VTM RTL-TVi BRF Fernsehen	Yes
Non-linear audiovisual media services (‘on demand’)	Netflix Auvio vrt.nu m.brf.be (BRF Mediathek)	yes
Linear sound media services	Online radio (economic services and non-economic activities)	No
non-linear audio servcies	Podcasts of radio stations : www.rtbf.be/lapremiere/podcast https://radio1.be/tag/podcast https://1.brf.be/podcast/	No
Non-economic broadcasting activities	Individuals who sporadically upload and broadcast videos via online platforms, in a simple sharing logic, within small	No

	communities, and without pursuing any real editorial ambition.	
Services that only transmit short programs or videos	Video sections on websites of some newspaper and magazines	No
Video platform services (providing user-generated programs or videos)	YouTube	No (but referred as a separate category under the revised AVMS Directive)
Video on social media	Facebook Instagram TikTok Periscope Vimeo Snapchat Dailymotion	No (but referred as a separate category under the revised AVMS Directive)

Table 1: Media identification by type of services as received from the Media NRAs

It should be noted that if this approach is followed, then it is not only the "economic service" criteria that should be reconsidered, but also potentially other criteria as:

- editorial responsibility;
- principal purpose;
- provision of audiovisual programmes;
- in order to inform, educate or entertain.

Such an approach considers that any audiovisual content that is made available to the general public via electronic communication networks should be, for the purpose of the present study, considered as media.

When comparing this proposed approach of the media NRAs to the approach set forward by BIPT, one can conclude that the scope of media is quite wider in approach 2 (NRAs interpretation).

This can be summarised as follows:

	Approach 1	Approach 2
8. be a service	Economical	Economical and Non-economical
9. editorial responsibility	Yes	No
10. principal purpose	Yes	No
11. provision of audiovisual programmes	Yes	Yes
12. in order to inform, educate or entertain	Yes	Yes
13. to the general public	Yes	Yes
14. via electronic communications networks	Yes	Yes

Table 2: Summary media interpretation approach 1 vs. approach 2

4.1.4 The current practice on Media regulation by the NRAs

In the AVMS Directive, it is stated that, in order to ensure its effective implementation, it is crucial that Member States establish and maintain up-to-date records of the media service providers and video-sharing platform providers under their jurisdiction and that they regularly share those records with their competent independent regulatory authorities or bodies and the European Commission[16]. All these market players can also be found in the MAVISE database that is managed by the European Audiovisual Observatory, which is fed mainly by data collected among media regulators.

Analysis of the registers of different Belgian NRAs is providing a view on what they consider to be audiovisual media services and is consistent with the practices of their European counterparts. These registers are also aligned with the AVMS Directive and the interpretation as explained for approach 1.

In the current registers from the VRM, CSA and Medienrat other potential media content suppliers that meet the criteria of approach 2, such as for example vloggers are not withheld. Only traditional television and radio players are registered. The Media NRAs are however evolving to obtain more impact on the new media content providers and the cross-border implications they cause. In its work programme 2020, ERGA has planned to start a specific workgroup focusing on regulation of vloggers[17]. The CSA has stated that they have started discussions with the main French-speaking Belgian vloggers in this regard[18], without however providing an exhaustive list of possible targeted players.

4.2 Methodology to determine media

The purpose of this study is to determine the presence of media in the total mobile data traffic. The definition of Media, and the interpretation of this definition, varies between NRAs and depends on specific factual circumstances. In addition, an ad hoc analysis of each destination on the internet is materially almost impossible, and even then, the results can vary depending on specific interpretations by the competent authorities.

It is neither the intent of this study to develop a new definition or interpretation of a definition on what media means in Belgium or in a Community, nor to have the ambition to indicate whom or what should be regulated as a media service. The aim is only to use a definition of media that can be measured, that relies on the implementation of the legal framework by the regulators and that allows an equal treatment of all authorities in Belgium.

4.2.1 General approach

The proposed approach by BIPT (approach 1) results in a media categorization based on the analysis' done by the NRAs in Belgium and Europe and is providing a clear view on the current landscape of

[16] Eur-Lex (November 2018), Directive (EU), *2018/1808 of The European Parliament and of The Council of 14 November 2018 amending Directive 2010/13/EU on the coordination of certain provisions laid down by law, regulation or administrative action in Member States concerning the provision of audiovisual media services (Audiovisual Media Services Directive) in view of changing market realities.* https://eur-lex.europa.eu/eli/dir/2018/1808/oj

[17] ERGA Work progamme 2020 proposal

[18] http://csa.be/breves/1374

media consulted via mobile data, by applying the interpretation of criteria as set forward by the AVMS Directive and further detailed in the recommendation of the CSA. Based on the NRAs register, it is possible to come to a reliable analysis of media presence in the mobile data usage. In approach 1, the main challenge is to determine whether a video on social media and video-sharing platforms has an economic purpose and are subject to an editorial responsibility. From a forward-looking perspective this approach (approach 1) however has its limitations as it risks to exclude possible new media types and roles and responsibilities that will emerge in the next years. As such, approach 1 is a strict approach to determine the media presence. Nevertheless, this can be leveraged in the forecasting model where an evolution of the media landscape has been taken into account.

The proposed approach by VRM, CSA and Medienrat (approach 2) has a broader view and expands the interpretation of the current legal framework. However, as approach 2 is identifying almost all public video as media, a reliable analysis is possible. The main challenge in this approach is to define the part of video that has to be considered as private content and, hence, is excluded as media.

It has been decided to use approach 1 as well as approach 2 to determine the presence of media in the total mobile data traffic. The results of these approaches can be considered as the borders in which the media area can be defined.

Phase 1: analysis of registered content

The first phase is the same for both approaches. A different media identification will be used only in phase 2 depending if approach 1 or 2 is applicable. The first phase is composed out of 3 stages.

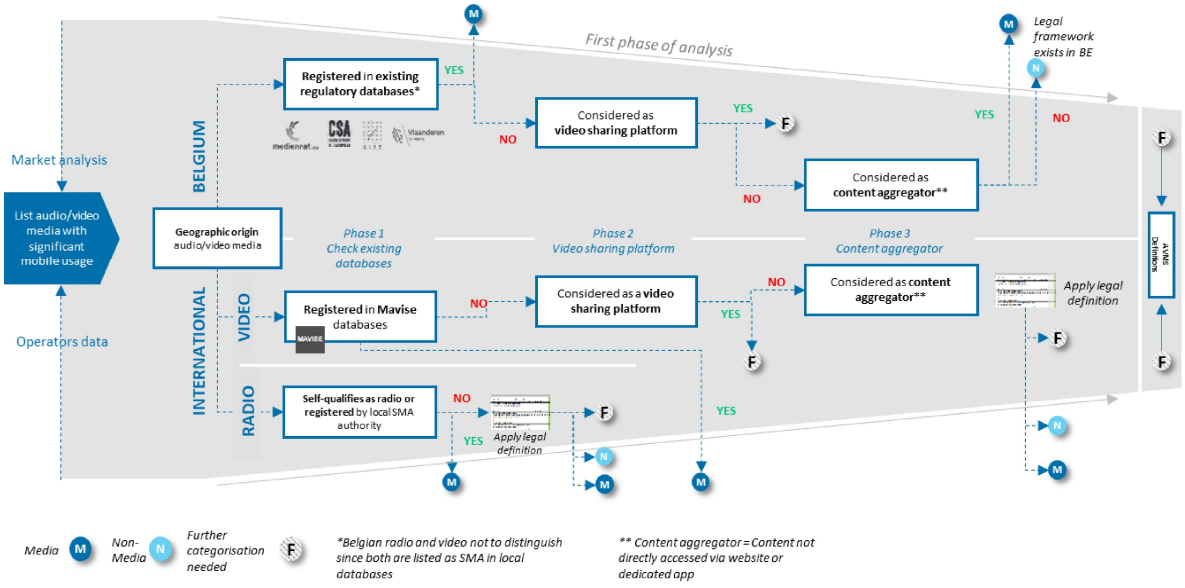

Figure 4: analysis of registered content

In the first stage, we verified if content has been qualified as audiovisual media content by the authorities in charge, in Belgium and abroad. Then, there is no doubt that the content delivered by media providers which are registered at/ licensed by media NRAs is categorized as media.

For Belgian content, this can be done by looking at the registries of the various types of audiovisual media services registered at / licensed by the CSA, VRM, Medienrat and BIPT. These registers contain tv-like and radio-like content. For instance, content coming from VRT, RTBF, but also from local radio stations is media.

For foreign content a differentiation between TV-like and radio-like content is in order. TV-like content is assessed by checking the MAVISE database from the European audiovisual observatory, which lists audiovisual media services available in 41 EU countries[19]. For example, the content delivered through the Netflix app is audiovisual media content as this audiovisual media service is registered at the Dutch media regulatory authority. However, for radio-like content there is no equivalent of the MAVISE database available.

For video-content outside of the EU and radio-like outside of Belgium we will apply the 7 decision criteria from the AVMS directive

In the second stage an analysis is performed on the video-sharing platforms (YouTube, Vimeo, Dailymotion and similar) and other social media platforms such as Facebook and Instagram. On these platforms we identified what type of accessed content is audiovisual media and which is not. For the same content, we will first identify if the content is shared by the by NRAs licensed or registered channels. For the other content, we will apply the decision criteria from the AVMS directive. We have shifted our analysis from the supply-side to the demand-side as neither the operators, equipment providers nor the media regulators could provide detailed insights on accessed content via these platforms. Therefore, we have analysed the content on the main platforms by taking samples, performing desk research on relevant reports and using user surveys.

The third stage consists out of analysing audiovisual media which is not accessed directly by the user via the website (e.g. www.rtbf.be) or the dedicated app (e.g. Auvio) of the audiovisual media service, but via an aggregator/distributor of several audiovisual media service, namely content aggregators. Contrary to most EU countries, this function has been identified in the legal framework in Belgium, in all Communities, as well as at the federal level. Proximus, Telenet, Orange, VOO… are registered by the media regulatory authorities in Belgium as distributors of audiovisual media services. In addition, the content these channels are distributing must be licensed and/or registered. For example, all the content accessed by the user via the Proximus Pickx app is audiovisual media content.

Phase 2: applying the AVMS guidelines

In the following phase the content that could not distinctly be attributed to the media- or non-media category by applying the AVMS directive has been analysed. As previously explained, the interpretation of these guidelines varies depending on the approach (1 or 2) that is used. An analysis of the content has been performed for both approaches.

[19] http://mavise.obs.coe.int/

	Approach 1	Approach 2
1. be a service	Economical	Economical and Non-economical
2. editorial responsibility	Yes	No
3. principal purpose	Yes	No
4. provision of audiovisual programmes	Yes	Yes
5. in order to inform, educate or entertain	Yes	Yes
6. to the general public	Yes	Yes
7. via electronic communications networks	Yes	Yes

Table 2: AVMS guidelines interpretation approach 1 and approach 2

With this methodology it is possible to categorize all content as media or non-media.

5. VOLUME

5.1 Introduction

Considering the focus of the study is Media in Mobile Data usage, the forecasting model is centred around all Mobile Data generated on the licensed spectrum. This implies that all types of Mobile Data traffic must be considered, resulting in a total "**Mobile Data Volume**", which is defined as follows:

> "*All national cellular mobile data traffic (incl. both up- and download) in Belgium, including both B2C, B2B and Wholesale traffic on a licensed spectrum.*"

As all B2C, B2B and Wholesale mobile data traffic is to be considered, two concepts are introduced to make a clear distinction between two classifications with inherently different data usage patterns, namely:

- **Individuals:** All individuals (i.e. people) generating mobile data traffic by means of a personal or professional mobile subscription and device.
- **Objects:** All objects (i.e. things) generating mobile data traffic by means of an M2M (machine-to-machine) or IoT (Internet of Things) subscription, often in the context of a B2B contract.

Each classification encompasses both B2C, B2B and wholesale, covering the entire range of Mobile Data usage. In this chapter, we explain for each classification the underlying model structure as well as the gathered data to both baseline and forecast Mobile Data Volume.

5.2 Individuals

5.2.1 Overview

When using the term "**Mobile Data Volume of Individuals**" we are referring to the following:

"*Mobile Data traffic generated by people via their personal (B2C) or professional (B2B) Mobile subscription using the Belgian licensed spectrum. International end-users roaming in Belgium are included, while Belgian users roaming abroad are excluded.*"

To baseline and forecast the amount of Mobile Data Volume generated by Individuals, we need to answer the following questions:

- How many end-users are there?
- How much average daily usage does each end-user have?
- What network type do they use and when?
- What additional/new mobile data traffic will be available and how much volume will it generate?

With this set of questions in mind, the Individuals' aspect of the model was created and refined over time. The result can be summarized as follows:

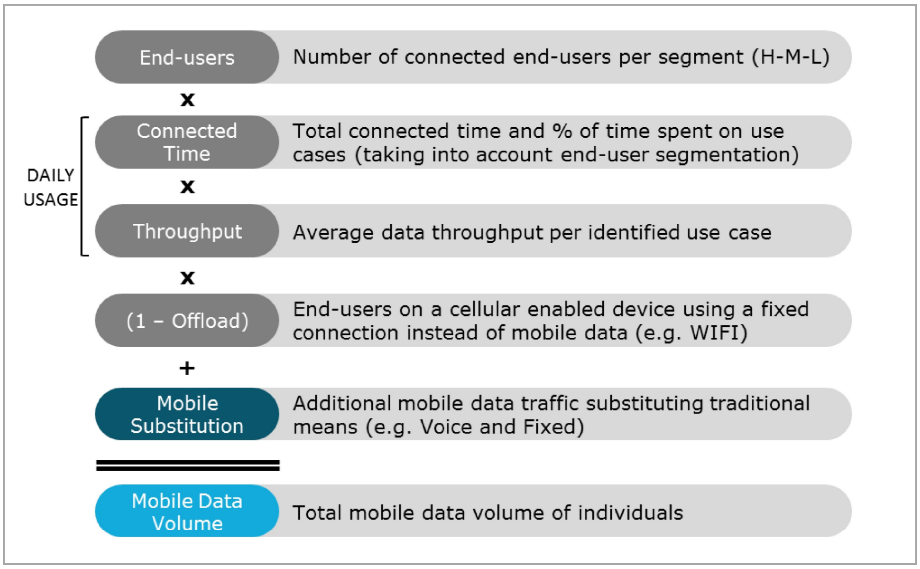

Figure 5: Computation of the mobile data volumes generated by individuals

In the next chapters, the structure and logic behind each component is described in detail, resulting in a forecast of each.

5.2.2 End-users

In the context of Individuals, an **end-user** is considered as a person who actively uses a personal or professional mobile subscription on the Belgian licensed spectrum. This implies that Belgian individuals roaming outside Belgium are not considered as end-users, whereas non-Belgian individuals roaming in Belgium are accounted as end-users.

It is pertinent to note that the focus lies on active usage, excluding "dormant" subscriptions (i.e. not used at least once per month). Hence, average daily usage will set the base for the next chapter.

The following diagram offers an overview of the logic behind the end-user calculations:

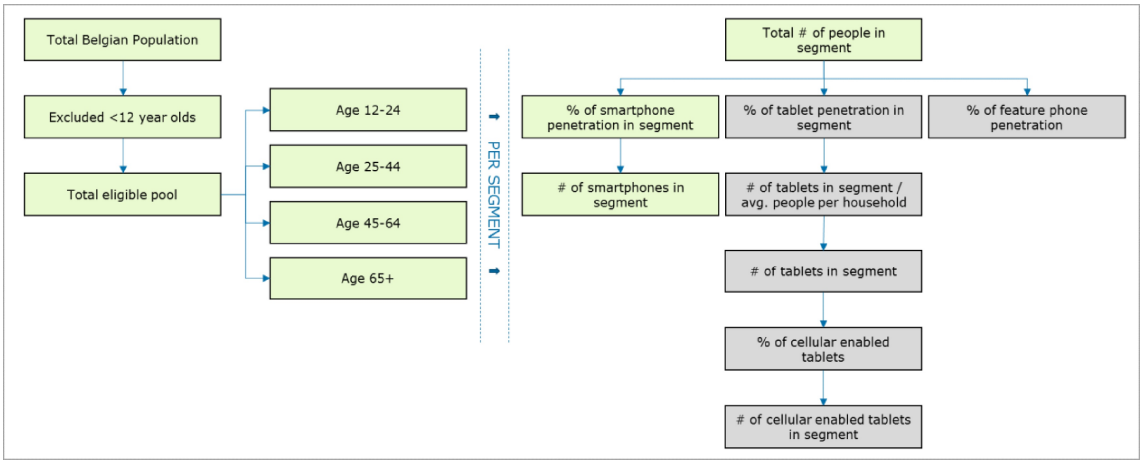

Figure 6: End-user identification and segmentation - Flowchart

As a starting point, we used the Belgian population forecast of Statbel to identify the figures for total Belgian Population between 2019 and 2040. [20] Due to the fact that in Europe smartphone penetration only reached 20% at the age of 10 and 50% at the age of 14 in 2015 [21], people under the age of 12 from the total eligible end-user pool have been excluded. The majority of children under the age of 12 do not have a device, and those who are going online are mostly using the device of a parent (in that case usage is included in the traffic of the owner of the device) and/or connect via the WiFi network. It has been assumed that, by putting the turning point at the age of 12, the number of potentially active end-users under the age of 12 is offset with the number of potentially inactive end-users between 12 and 16 years old.

Additionally, the number of Belgians roaming abroad and the number of non-Belgians roaming within Belgium has been presumed to offset each other. This leaves a total eligible end-user pool of 9.879.844 people in 2019.

The detailed Statbel forecast figures per age enabled to both segment and forecast the total eligible end-user pool into four key segments:

Segment 1: Age 12 to 24
Segment 2: Age 25 to 44
Segment 3: Age 45 to 64
Segment 4: Age 65+

The rationale behind this segmentation is that within each age group the context of activities (e.g. studying, start of career, end of career, retirement) is roughly the same for the end-users. The information provided by IMEC Digimeter containing socio-demographic data as well as data regarding connected time confirmed this assumption.

As a next step, being a prerequisite to generate mobile data traffic, the number of mobile devices within each segment has been computed to identify actual end-users within the total eligible end-user pool. The IMEC Digimeter results published in 2019[22] were used as a starting point to baseline the penetration of the following devices per segment:

- Tablets
- Feature phones[23]
- Smartphones

Although these figures are Flanders specific, their level of detail provided the required insights and have therefore been considered worth extrapolating to Belgium. The user survey confirmed that

[20] Statbel (January 2019), *Bevolkingsvooruitzichten*. https://statbel.fgov.be/nl/themas/bevolking/bevolkingsvooruitzichten#panel-13.
[21] Tnuda (Novembre 2017), *Extent of cellphone usage by children and teens worldwide.* https://www.tnuda.org.il/en/populations-risk/children-adolescents-%E2%80%93-introduction/extent-cellphone-usage-children-and-teens.
[22] Imec (2019), *IMEC.DIGIMETER 2018*. https://www.imec-int.com/drupal/sites/default/files/inline-files/457015-IMEC-DIGIMETER-2019-NL-v9.pdf
[23] Feature phone – mobile handset offering advanced features (e.g. camera, e-mail) within a restricted software platform that limits the user's opportunity to add third party software. They target the low end of the market and rely less on data connectivity

smartphone penetration and usage is roughly the same across Flanders, Wallonia and Brussels which comforted the decision for extrapolation of the IMEC data to the other regions.

Note that laptops were not taken into consideration as all internet traffic is presumed to be handled via Wi-Fi because laptops are primarily used at home or at the office. Additionally, the lack of laptop-oriented mobile data offerings as well as the actual number of SIM enabled laptops, indicates there is no real demand for this. Occasionally, end-users might use mobile hotspot and tethering to connect their laptop. As we do not have any truly representative data available[24], we assume that these numbers are neglectable. One might also argue that mobile data subscriptions for laptops could become more prominent with the introduction of the E-SIM. However, as this is highly speculative and we do not expect end-user behaviour to change drastically (i.e. laptops being used primarily at home or at the office), we disregard this for the purpose of this study.

Wearables have also been excluded from the model as most still fall under the "usurper" category, using only a Bluetooth connection to connect with a smartphone. This implies that the mobile data generated for using a wearable is encompassed in the respective application on the smartphone and should not be considered separately. We do not expect this to change drastically during the forecasting period, as the added value of having a separate wearable SIM – or even subscription – is fairly limited.

Tablets

Compared to smartphones, tablet penetration is relatively low across all segments (between 48% and 63%) and looking at historical data, has even started to decline. Tablet penetration has only slightly increased for segment 4 (Age 65+) in the last few years, which can be explained by spill-over effects originating in segment 3. However, it is also important to note that tablets are often shared within a household. As a Belgian household on average consists out of 2,3 people[25], the tablet usage per end-user had also to be measured. The IMEC Digimeter demonstrates that 80% of end-users do not use a tablet intensively on a daily basis, 43% do not have a tablet and 37% use it less than one hour per day.

Additionally, considering only 10% of all available tablets are cellular enabled[26] and suspecting that not all end-users with cellular enabled tablets have a SIM card for it (i.e. only use it via Wi-Fi at home), the proportion of potential mobile data via tablets is neglectable. It has therefore been decided to exclude tablets from our forecasting model.

Feature phones

Unsurprisingly, feature phone[27] penetration has significantly dropped in recent years and will continue to do so across all segments. Even within segment 4 (Age 65+), feature phone penetration is already down to 39,72% and still steadily declining. Next to the low penetration, feature phones also barely

[24] L. Arnold (June 2017), *AW Poll: zoveel gigabytes worden er verbruikt door tethering*. https://androidworld.nl/nieuws/aw-poll-zoveel-gigabytes-worden-er-verbruikt-door-tethering/
[25] Statbel (January 2019), *Bevolkingsvooruitzichten*. https://statbel.fgov.be/nl/themas/bevolking/bevolkingsvooruitzichten
[26] I. Lunden (March 2012), *WiFi Rules, OK? Only 6% Of iPad Sessions Come From Cellular Networks.* https://techcrunch.com/2012/03/23/wifi-rules-ok-only-6-of-ipad-sessions-come-from-cellular-networks/
[27] A mobile handset offering basic features within a restricted software platform that limits the user's opportunity to add third party software. Feature phones rely less on data connectivity.

generated any mobile data traffic due to the lack of apps and often limited embedded network technology. Therefore, feature phones were excluded from the forecasting model by itself. We did, however, consider the decrease of feature phones when forecasting smartphone penetration.

Smartphones

Smartphone[28] penetration is at an all-time high level with a continuous to gradual increase. Although a slowdown can be expected for segments 1 and 2 (95%), smartphone penetration in segments 3 (83%) and 4 (52%) still leaves room for additional growth. By considering historical data, spill-over effects as well as the decline in feature phones, smartphone penetration could be forecasted as presented below:

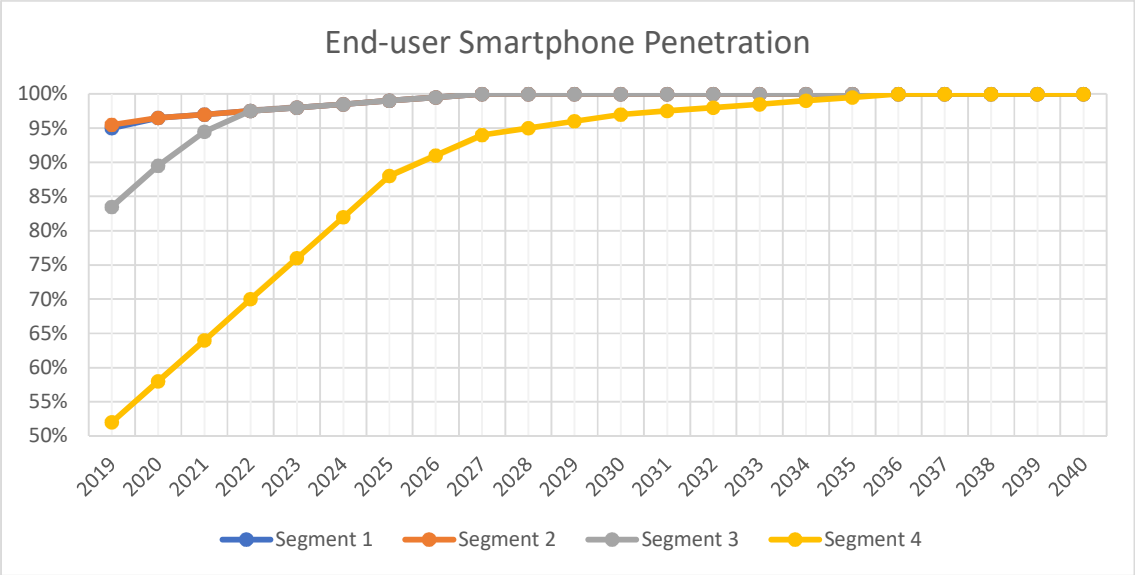

Figure 7: Evolution of end-user smartphone penetration

According to our forecast, smartphone penetration reaches 100% across all our segments by 2036. We expect penetration within segment 4 to rapidly increase over the next few years and slow down over time. Smartphone penetration will, however, only reach 100% over a period of 10 to 15 years as we do not expect that elderly not owning a smartphone now will decide to purchase one.

For the purpose of this study, the assumption has been taken that each end-user only has one smartphone, therefore, the penetration has been capped at 100%. Although in reality a small proportion of end-users might have multiple smartphones, considering the focus on active users in the next chapter, an end-user is considered that he can only use one smartphone at a time.

Similarly, End-users with dual SIMs have not been considered (i.e. more than one SIM in a smartphone), regardless of what network it is using, as a smartphone is presumed to actively use only one data connection at a time.

[28] A mobile phone that runs a complete operating system and provide third party software development guidelines and marketplace. Smartphones feature advanced capabilities beyond voice calls and SMS (e.g. email, calendar, maps), often relying heavily on mobile data connectivity for enhanced features or data synchronisation.

Based on the above, we end up with a total of 8.1 mio end-users as a baseline (2019).

5G Adoption

From a forecasting perspective, it is also important to consider end-user adoption of 5G due to its wide range of potential impact[29]. Therefore, BIPT provided estimations in terms of timing, which were then used to calculate the adoption rate.

Assuming the 5G auction will take place during 2021, the following timings regarding coverage requirements – as received from BIPT – are considered:

- 70% of the population by mid-2022
- 99,5% of the population by mid-2023
- 99,8% of the population by mid-2027

Based on the coverage requirements, a maximum adoption rate over time was established. The actual adoption rate was then determined by looking at historical data of the 4G roll-out. Although one might argue that 5G adoption[30] will be faster[31], we expect the additional benefits to be initially fairly limited and that the mark-up pricing of 5G enabled devices will slow down overall adoption. Therefore, we assume it will be roughly the same as it was for 4G over time. The resulting adoption rate, decided by 5G enabled devices, is as follows:

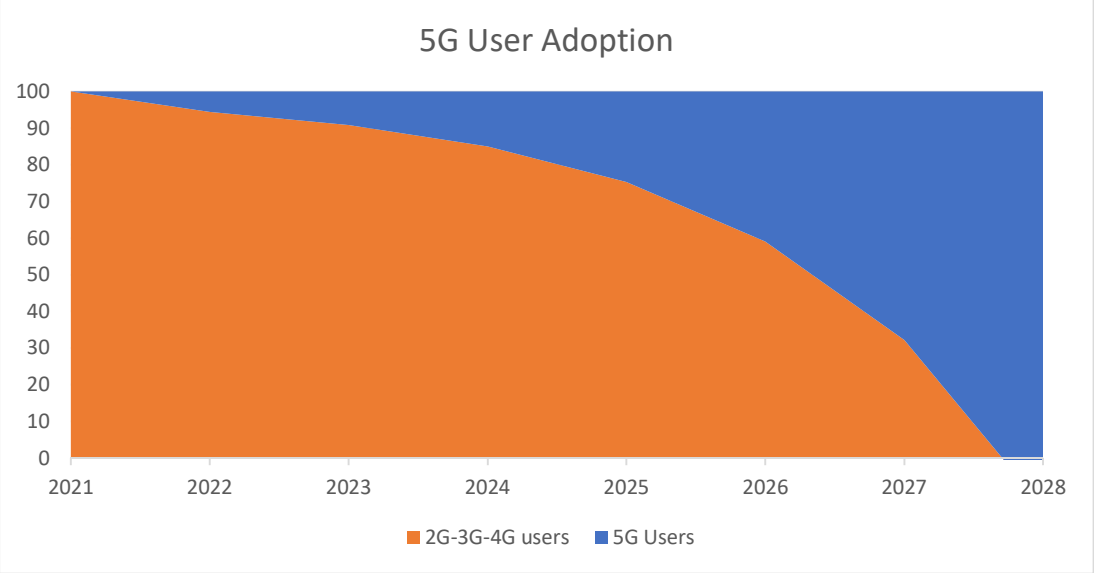

Figure 8: Evolution of 5G user adoption

The 5G adoption starts as early as 2022, by 2028 99% of end-users will be able to use 5G. Segment 4 is an exception to this high adoption rate as due to a lower smartphone penetration the 5G adoption comes later. This adoption rate does not imply that 2G, 3G or 4G will no longer be used as off 2028.

[29] R. Clark (February 2019). *Six Months of 5G: What We've Learned From South Korea*. https://www.lightreading.com/asia-pacific/six-months-of-5g-what-weve-learned-from-south-korea-/d/d-id/754562.
[30] Note that end-users who adopted 5G may still use 2G, 3G or 4G connectivity (e.g. due to coverage limitations).
[31] S. McCaskill (November 2019), *5G adoption set to be much faster than 4G*. https://www.techradar.com/news/5g-adoption-set-to-be-much-faster-than-4g.

These access technologies will continue to be used depending on location, situation and network availability.

5.2.3 Daily usage

As a next step, a forecast for the average weekly mobile volume per end-user for each of our four segments has been computed. It is important to note that, at this stage, the difference between Wi-Fi and mobile data traffic is not yet taken into account and daily mobile (i.e. smartphone) usage is consider in its entirety, regardless of the network type.

The following diagram offers an overview of the logic behind our daily usage calculations:

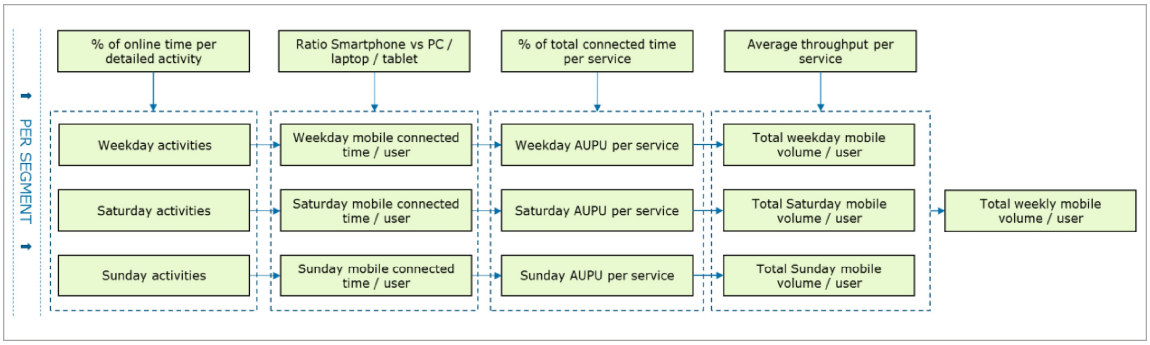

Figure 9: Computation weekly mobile volume consumption - Flowchart

In summary, daily usage can be broken down into the following key elements:

- Daily connected time
- Connected time per service category
- Average throughput per service category

Daily connected time

In order to identify daily connected time today, a decent understanding of each end-user segment's daily activities was required. As a baseline, the available data sets of the time-use.be study have been analysed.[32] This study, started in 1999, illustrates that the main daily activities and time spent on these are only subject to minor fluctuations over the years. On average the 24 hours in a day are divided over the following activities: paid work, household work, childcare and raising children, personal care, sleep and rest, education, social participation, free time, transportation and others.

The detailed insights gained from the study helped to assess daily activities per segment on both weekdays as well as on Saturdays and Sundays.

[32] Time-use (February 2014), *Table manual*. http://www.time-use.be/en/statistics..

daily activities per segment	Weekdays				Saturday				Sunday			
	12-24	25-39	40-64	65+	12-24	25-39	40-64	65+	12-24	25-39	40-64	65+
Paid work	0:59:26	4:50:27	3:16:32	0:05:17	0:28:02	1:09:00	0:55:49	0:03:20	0:18:20	0:34:19	0:32:02	0:00:33
Household work	0:55:39	2:01:35	2:59:41	3:36:55	1:14:24	3:05:00	3:35:20	3:21:13	0:54:02	2:17:57	2:44:56	2:28:59
Childcare and raising children	0:06:01	0:56:28	0:16:26	0:06:22	0:05:41	1:00:30	0:12:15	0:03:20	0:10:21	0:55:05	0:13:28	0:03:46
Personal care	2:18:30	2:12:52	2:25:30	2:40:30	2:26:30	2:37:00	2:44:00	2:39:00	2:29:00	2:28:00	2:33:30	2:46:30
Sleep and rest	9:08:30	8:22:00	8:33:00	9:51:00	10:00:30	9:00:00	8:54:00	9:46:00	11:03:00	10:18:00	9:49:00	9:54:30
Education	3:59:45	0:15:07	0:05:12	0:03:04	1:17:05	0:04:26	0:02:58	0:00:42	1:19:06	0:06:08	0:03:31	0:01:41
Social participation	1:12:27	0:59:26	1:18:43	1:18:34	1:58:42	2:14:56	2:01:55	1:45:15	1:37:39	1:57:34	1:58:20	1:54:08
Free time	3:51:02	2:49:59	3:41:33	5:21:39	5:06:20	3:21:35	4:12:57	5:23:01	5:12:46	4:09:15	4:59:26	5:57:22
Transportation	1:22:43	1:29:23	1:17:14	0:49:48	1:15:00	1:23:48	1:15:44	0:51:36	0:52:25	1:08:36	1:00:42	0:47:11
Other	0:03:41	0:03:47	0:05:13	0:07:43	0:06:44	0:03:44	0:04:37	0:06:48	0:03:41	0:04:22	0:05:09	0:04:46

Table 3: Daily activities on weekdays, Saturday and Sunday per segment

To determine the time spent on the several daily activities over the next 20 years, we assume that the basic division of activities remains stable. This is supported by the results of comparing time spent in 1999, 2005 and 2013. Over this period no major changes in time spent haven been identified. As such, an introduction of a new technology is not changing the basic actions and time spent of persons (sleeping, eating, working...) but some actions itself can indirectly be influenced. Therefore, slight modifications have been introduced in the model.

Based on the identified daily activities[33], potential online time per daily activity for each segment has been determined. Although the time spent on a daily activity remains stable, behaviour and actions evolve partly due to technological evolutions. With the evolution of mobile devices of the access technologies and of the services offered, the potential online time increases over time. These evolutions are considered for several daily activities.

Due to a continued increase of people working from home[34], time spent on transportation during weekdays for segments 2 and 3 will decrease slightly. The freed-up time will move to the "free time" category, as people are expected not to work longer due to this.

As we expect the introduction of self-driving vehicles in 2030, time spent as a "car driver" will be gradually transformed into time spent as a "car passenger". This implies that additional potential online time is generated from self-driving vehicle passengers.

Because of new and improved smart home solutions, we believe that household work will be done more efficient over time.[35] Although this is a relatively small efficiency gain, the reduction in time spent on household work during both weekdays and weekends (across all segments) does result in additional free time.

Within free time, we see a clear shift from watching TV towards the use of 'new media', increasing substantially the potential online time.

We assume that, in line with historical data[36], the percentage of mobile usage (i.e. smartphone) will continue to grow over time. Segments 3 and 4 currently have a relatively low percentage of mobile

[33] Overview of all detailed activities: Motus (February 2014), *BTUS13_Codeboek*. http://www.motus.vub.ac.be/media/guide/TUS_activitylist.pdf

[34] N. Christidis (February 2018), *Home Working in Belgium: Benefits and Challenges*. http://blog.mynextcompany.eu/en/home-working-belgium

[35] Forbes technology Council (January 2018), *14 Predictions For The Future Of Smart Home Technology*. https://www.forbes.com/sites/forbestechcouncil/2018/01/12/14-predictions-for-the-future-of-smart-home-technology/#317b94932e21

[36] Deloitte (2019), *Content is king.* https://www2.deloitte.com/be/en/pages/technology-media-and-telecommunications/topics/mobile-consumer-survey-2019/media-consumption.html

usage compared to PC, laptop and tablet, however, growth of mobile usage is expected to be higher in these segments due to spill-over effects.

All the above combined provided a granular view on daily potential online time per segment on both weekdays and weekends. Of course, not all potential online time necessarily results in actual online time. Therefore, based on the results from the user survey, 50% of all potential online time is assumed as actual online time – which was validated by our available benchmark data.

As mentioned in the previous chapter, the focus of the forecasting model is around smartphone usage. Therefore, actual online time per segment had to be broken down into time spent on PC, laptop, tablet and on smartphone. The global segmented figures from the Global Web Index[37] – which have been extrapolated to Belgium – enabled to identify per segment the percentage of actual online time spent by end-users on their smartphone. According to these figures, and in line with expectations, the younger a segment, the more they use a smartphone within their actual online time compared to PC, laptop and tablet.

Based on these calculations, the daily mobile connected time[38] of each segment both during weekdays as well the weekend could be computed. For 2019, this resulted in a weighted average daily mobile connected time of 2 hours 26 minutes 31 seconds. When comparing this to the data acquired from IMEC (Mobile DNA) and Profacts (User Survey), average daily mobile connected time benchmarks as follows:

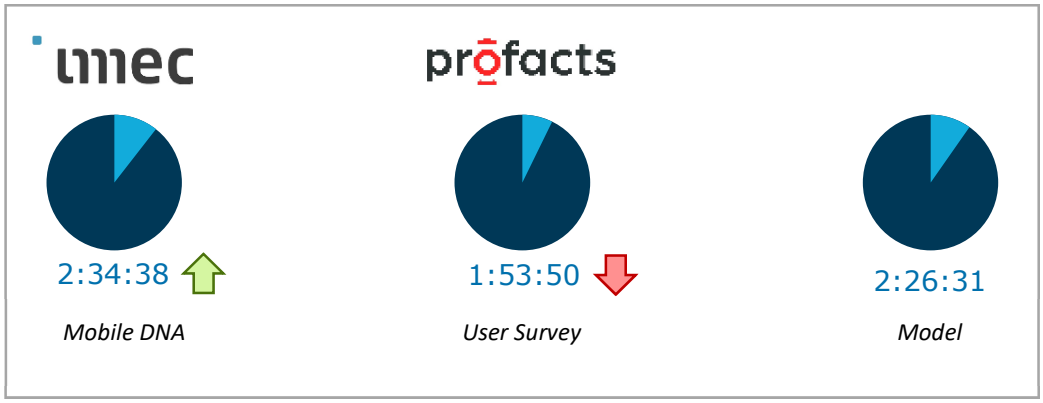

Figure 10: Comparison Imec and user-survey output

The baseline outcome of our forecasting model is slightly lower compared to the data received from IMEC, whereas it is higher when looking at the average daily connected time retrieved from our user survey. However, considering the user survey is limited by the fact that it is self-reported and "what people say, is not what people do", the Mobile DNA data – which tracks actual usage – has been regarded as more trustworthy. As the model is very close to the Mobile DNA results we can consider that the model is based on realistic usage assumptions.

[37] Digital marketing community (2019), Device Flagship Report Q1, 2019 | GlobalWebIndex. https://www.digitalmarketingcommunity.com/researches/device-flagship-report-2019/

[38] Note that daily mobile connected time refers to daily time spent actively using a smartphone.

The afore mentioned assumptions resulted in the following forecast across our segments:

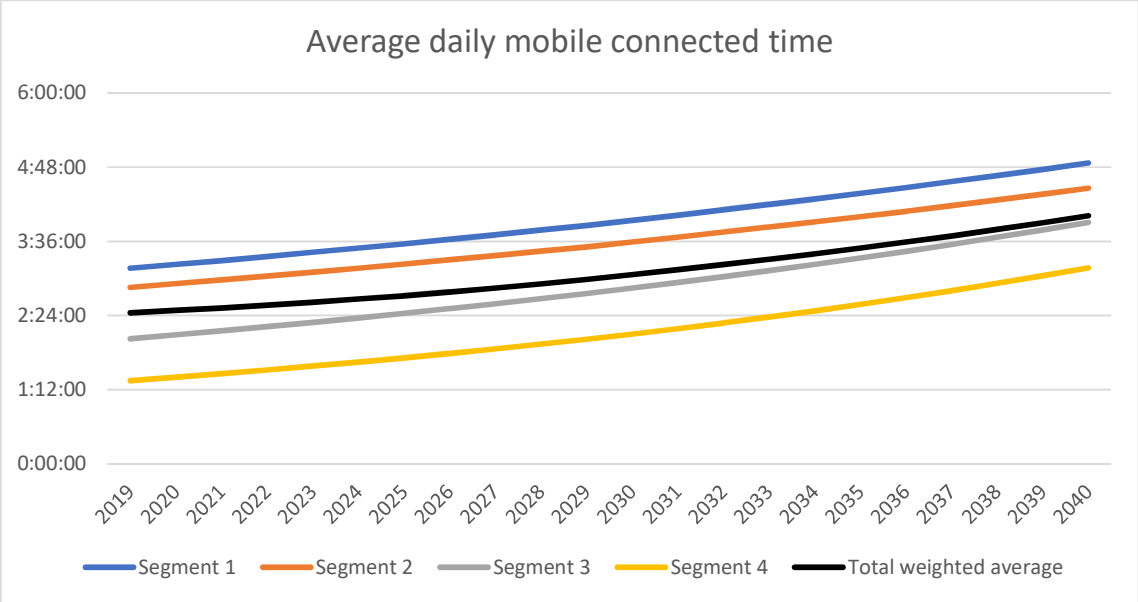

Figure 11: Evolution of the average daily mobile connected time

The average daily mobile connected time increases with 1h34 min over time towards 4h a day. Within segment 1 the daily connected time in 2040 is expected to reach 4h52min. With an average yearly increase of almost 5 min of daily usage, the daily mobile connected time is accelerating its grow in comparison with the period from 2010 to 2019.

Connected time per service category

To convert connected time to actual data usage, the identification of customer behaviour within their daily mobile connected time was required. Therefore, we collaborated with IMEC that had this detailed information available in their Mobile DNA dataset.

IMEC issued a list of the top 90% most used apps (in terms of average connected time) across their entire data set (N=6350) during 2019. The extensive list of applications has been analysed manually and mapped to the pre-defined service categorisation. Because the IMEC database is focussing on Flanders, the content has been cross-checked with the main mobile data destinations reported by the mobile operators. When a significant destination has been detected that was not withheld in the IMEC database this destination has been inserted in the model.

The service categories can be defined as follows:

- **Social Media:** Services which are predominantly focused around users creating and sharing content or participating in social networking (e.g. Facebook or Instagram).
- **Browsing:** Services which are aimed at users accessing websites and/or information, primarily in static format (e.g. Google Chrome or HLN).
- **Messaging:** Services which allow users to send personal messages as well as perform VoIP and video calls (e.g. Whatsapp or Facebook Messenger).

- **Video Streaming**: Services which are centred around streaming video content and this being their core activity (e.g. Netflix, YouTube, VRT Nu, Auvio..).
- **Gaming:** Services which allow users to play games on their mobile, ranging from rather simple games to fully immersive games (e.g. Candy Crush or Pokémon Go).
- **Maps & Navigation:** Services which help users with maps and navigational tasks as well as track their physical activity (e.g. Waze or Strava).
- **Email:** Services which enable users to both send and receive emails (e.g. Gmail or Outlook).
- **Audio Streaming:** Services which are centred around streaming audio content and this being their core activity (e.g. Spotify, Google Play Music, iTunes,..).
- **Cloud Storage:** Services which are used to store and/or backup personal files and information in the cloud (e.g. Google Photos or iCloud).
- **App Store & Updates:** Services which allow users to find and download new apps as well as update their OS and existing apps (e.g. Google Play Store or App Store).
- **Offline:** Services which do not require any network connectivity and can be used offline at all times, often native apps (e.g. Calculator or Clock).

Due to the remaining 10% of average connected time consisting out of 32.429 applications, manual analysis was not feasible within the time constraints. Therefore, IMEC provided an aggregated category analysis based on a scraping tool which retrieved app categories for the respective apps from the app store. Based on this, it has been possible to conclude that our mapping of the top 90% would not be impacted heavily by the remaining 10%.

Based on the above, a weighted average across all segments of the daily mobile connected Time per service category has been determined. By comparing the output of the model with the mobile DNA data set as well as data available from OfCom regarding mobile usage[39], sanity checks were performed to validate the weighted average daily mobile connected time per service category. Those sanity checks turned out to be successful.

Starting from these baseline figures, the following assumptions have been considered to forecast the percentage of daily mobile connected time per service category:

- Due to an increased presence of video[40], the percentage of daily mobile connected time for service categories Browsing and Social Media has been considered to gradually increase over time.
- With the increase of video calling[41], the percentage of daily mobile connected time spent on Messaging services has been assumed to increase over time.
- As more and more VR and Cloud gaming (e.g. Google Stadia[42]) services will be introduced and adopted, the percentage of daily mobile connected time of Gaming services will increase. However, only a slight increase has been taken into account as not the entire population is presumed to be adopting these types of gaming.

[39] Ofcom (2016), *The digital day.* https://www.ofcom.org.uk/research-and-data/multi-sector-research/general-communications/digital-day
[40] https://www.ericsson.com/en/mobility-report/reports/november-2019/mobile-traffic-by-application-category
[41] https://www.businesswire.com/news/home/20190117005173/en/Video-Calls-Fast-Popular-Voice-Calls-Reaching
[42] https://www.theverge.com/2019/11/18/20970297/google-stadia-review-gaming-streaming-cloud-price-specs-features-chrome-pixel

- With Video Streaming services more and more on the rise[43], mobile usage of said services is expected to grow over time. This is also in line with our user survey, which pointed out that "cord-cutting" remains an unfolding trend. Therefore, the percentage of daily mobile connected time spent on Video Streaming services increases.
- As daily mobile connected time is limited to 24 hours (i.e. 100%), all service activity growth replaces or reduces time spent on other activities.

Based on the above, the forecasted average daily mobile connected time per service category was computed for each segment during both weekdays as well as weekends (i.e. Saturday and Sunday).

The current weighted[44] average daily mobile connected time per service category is set as follows:

Category	
Social media	23,57%
Browsing	21,96%
Messaging	13,07%
Video streaming	9,68%
Gaming	8,42%
Maps & navigation	5,96%
Email	2,52%
Audio streaming	4,02%
Cloud storage	0,89%
Appstore & updates	0,32%
Offline	9,59%

Table 4: Current division of connected time per service category

The evolution of the weighted[45] average daily mobile connected time per service category is as follows:

[43] https://www.grandviewresearch.com/press-release/global-video-streaming-market
[44] Weights take into account both size of segment as well as weekdays versus weekend.
[45] Weights take into account both size of segment as well as weekdays versus weekend.

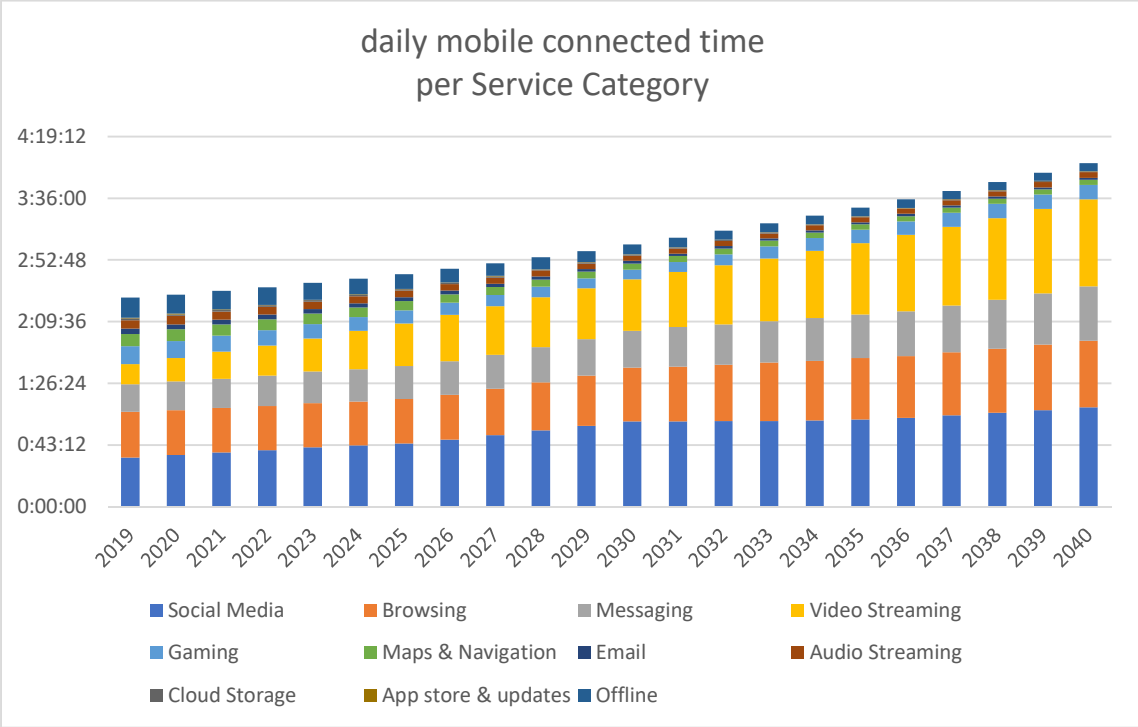

Figure 12: Evolution of the daily mobile connected time per category

Average throughput per service category

To transform our calculated connected time per service category into actual data usage volume[46], the concept of "average throughput per service category" has been used.

Average throughput can be considered as the average amount of data consumed over a period of time, which is calculated back to number of megabytes per second (MB/s). This takes into account both usage behaviour as well as accessed content. To illustrate, when using a video streaming service such as Netflix, the end-user is not per se continuously streaming video. He or she might be searching for content to watch, which implies a lowered throughput for a certain time. Additionally, once the video is buffered – using the maximum capacity – the video will keep playing, while the throughput will no longer be at its peak. Therefore, the average throughput over time has been considered and calculated back to per second, in order to be able to link it to our daily mobile connected time.

Of course, not all service platforms in a service category have the same average throughput. This implies that, besides the average throughput per service platform, the weighted average throughput within a service category has also been assessed.

To do so, operator data has been leveraged, tracking both the time spent using an app connected to the network as well as the data volume generated from it. This enabled to compute the average throughput (MB/s) per service platform. To identify the average throughput of each service category, all the available service platforms have been mapped and classified within the service categories. The

[46] As mentioned above, note that at this stage we are identifying total data usage volume, regardless of the network type (i.e. Wi-Fi or mobile data).

generated volume has been compared to the total service category volume as a weight, which resulted in a weighted average throughput per service category.

Based on this exercise, the baseline for the average throughput has been set for all our service categories. Evidently, the Offline service category has an average throughput of 0 MB/s and does not generate data volume. As the baseline throughput is based on actual figures the impact of current compression technologies is also incorporated in the figures.

The baseline being set, the forecast of the average throughput of each service category could be executed based on the following assumptions:

- Social media, browsing and messaging throughput will increase due to an increase in percentage of video, video calling and their quality[47] over time.
- Video streaming throughput will increase due to improvements in video quality[48] (SD to HD to UHD)
- Gaming throughput will increase due to increase in VR[49] and Cloud[50] gaming activity.
- Maps & Navigation throughput will slightly increase due to immersive activity[51] (e.g. 3D, AR).
- Email throughput will increase slightly as a consequence of the growth in number of emails being sent and received[52].
- Audio streaming throughput will increase due to more Hi-Res (lossless) audio quality[53].
- Cloud storage throughput will increase heavily due to larger files being up- and downloaded from/to smartphones[54].
- App store & updates will increase only slightly over time due to larger app sizes, as it is already relatively high from a baseline perspective.
- Compression techniques will evolve equally with the higher

The above resulted in the following forecast for average throughput per service category:

[47] http://www.streamingmediaglobal.com/Articles/Editorial/Featured-Articles/The-State-of-Mobile-Video-2019-130669.aspx
[48] http://www.streamingmediaglobal.com/Articles/Editorial/Featured-Articles/The-State-of-Mobile-Video-2019-130669.aspx
[49] https://www.mushroomnetworks.com/infographics/bandwidth-requirements-for-virtual-reality-vr-and-augmented-reality-ar-infographic/
[50] https://www.fiercevideo.com/tech/5g-will-drive-a-cloud-gaming-explosion-analyst-says
[51] https://mobidev.biz/blog/augmented-reality-future-trends-2018-2020
[52] https://www.statista.com/statistics/456500/daily-number-of-e-mails-worldwide/
[53] https://www.theverge.com/2019/9/17/20869526/amazon-music-hd-lossless-flac-tier-spotify-apple
[54] https://www.omrglobal.com/industry-reports/personal-cloud-market

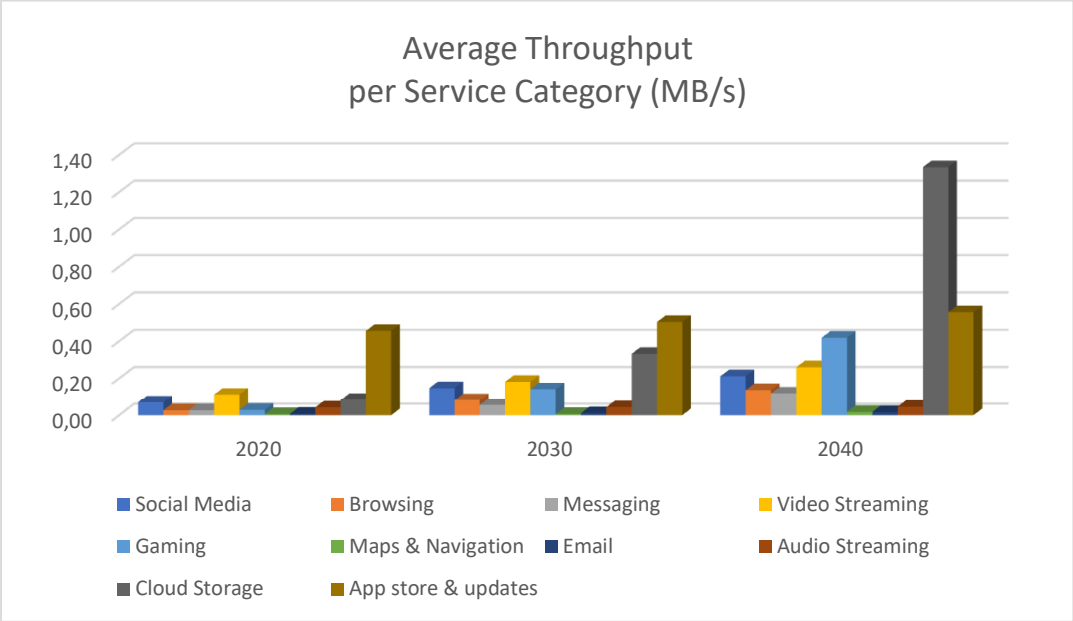

Figure 13: Evolution of the average throughput per service category

Total Data Volume

By linking the average throughput per service category with the daily connected time spent per service category, the computation and forecast the average total data volume per end-user has been calculated for each segment across weekdays, Saturdays and Sundays. By combining this with the number of end-users per segment, the total yearly data volume per segment has been forecasted. However, this is still total data volume generated by smartphones, regardless of the network type (i.e. Wi-Fi or Mobile Data). The next chapter explains how the ratio Wi-Fi versus Mobile Data has been computed.

5.2.4 Fixed Offload

Starting from the principle that 100% of all smartphones have the possibility to connect to both a Fixed network (i.e. Wi-Fi) as well as a mobile data network, the next step was to identify the percentage of Fixed Offload.

Fixed Offload is considered as the potential mobile cellular data traffic which is replaced by end-users on a cellular enabled device by using a fixed connection instead (e.g. Wi-Fi at home).

To improve the view on Fixed Offload in the Belgian context, the topic has been included in the user survey and permitted to identify a percentage of Fixed Offload per segment:

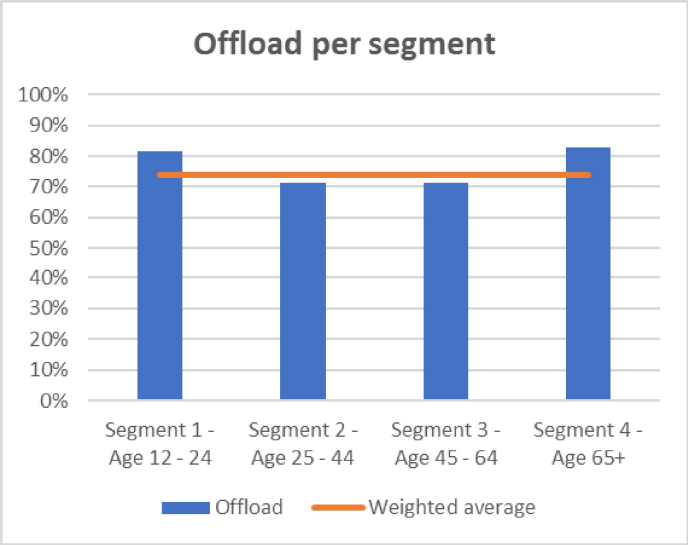

Figure 14: Offload per segment and weighted average

-

Depending on the segment the Fixed Offload percentages variate slightly. Overall a weighted average of 74,01% has been identified. When comparing this number to international figures[55], Fixed Offload in Belgium is relatively high.

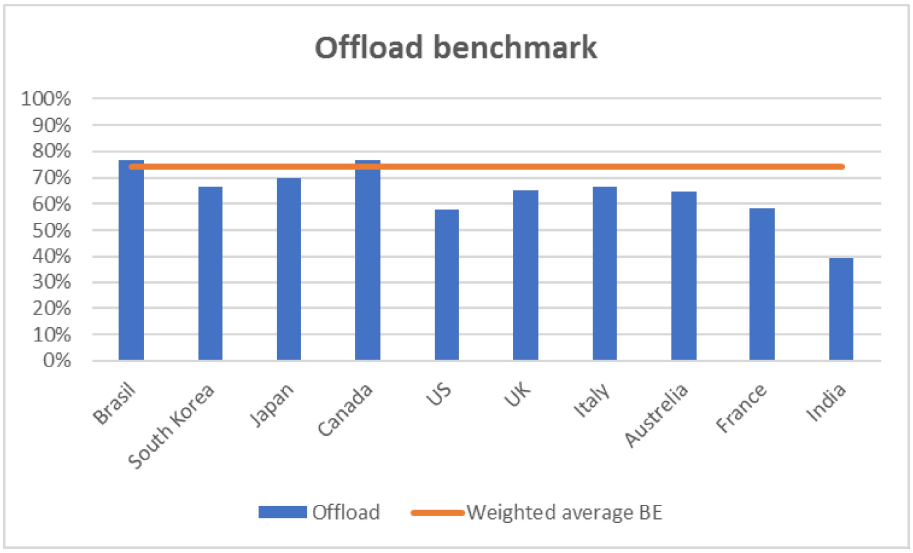

Figure 15: Offload level benchmark

[55] https://www.emarketer.com/chart/221131/average-mobile-data-usage-via-wi-fi-vs-network-among-mobile-users-select-countries-may-2018-gigabytes

This can be explained due to the fact that end-users perceive mobile data usage as being highly expensive – as concluded in our user survey. Therefore, contrary to Cisco's study[56], we believe that Fixed Offload in Belgium is already at its maximum and will not increase over time. We assume, however, that it will not decrease either due to the following reasons:

- The introduction of a lower price per GB and true[57] unlimited data plans will change end-user behaviour. However, we assume that apps will by default still offload as much as possible via Wi-Fi in the background. Additionally, we believe that with the introduction of 5G and true unlimited data plans, operators will push for Seamless Offload[58].
- Although out-of-home usage might increase over time, based on historical data received from BIPT we can assume that Wi-Fi penetration is also still rising, offsetting the impact on Fixed Offload.
- With 5G comes improved cellular network quality and a potential preference for mobile data. However, with the continued roll-out of Fiber-to-the-Home (FTTH) and the upcoming introduction of Wi-Fi 6.0[59], Fixed broadband will also drastically improve and provide higher reliability as well as speed. This combined with the aforementioned concept of Seamless Offload, we believe that the improved cellular network quality will not impact Fixed Offload.

Based on the above rationale, Fixed Offload is not expected to increase nor decrease over time.

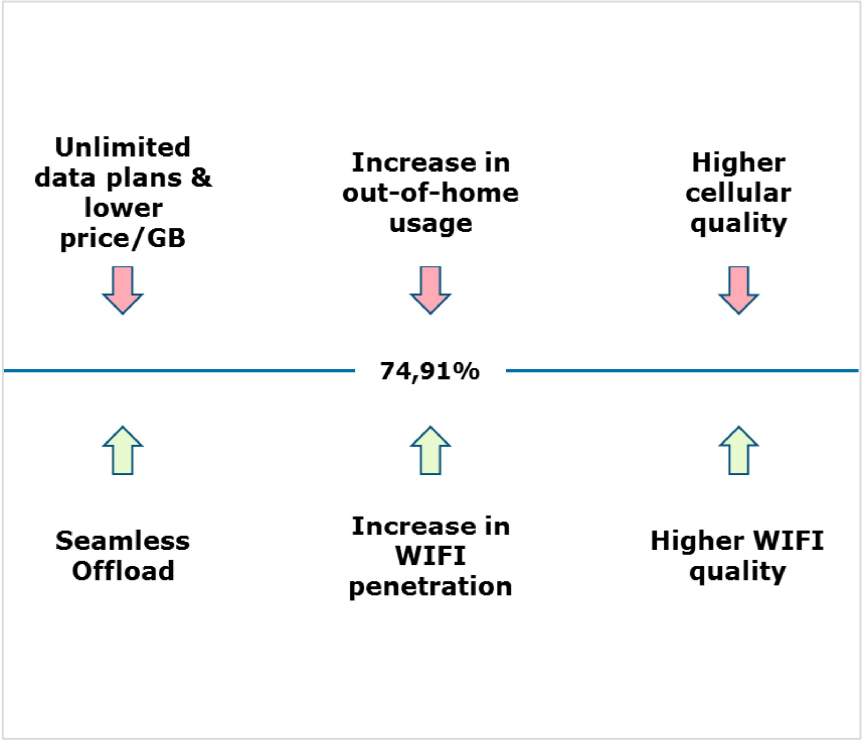

Figure 16: Factors influencing offload level

[56] https://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/white-paper-c11-738429.html#eot-doc-wrapper
[57] As unlimited data plans today are still capped at around 20GB and data speeds are throttled afterwards, we do not consider this as being "truly" unlimited.
[58] https://www.tessares.net/seamless-handover-maximising-mobile-data-offload-to-wi-fi-hotspots-outside-home/
[59] https://www.howtogeek.com/368332/wi-fi-6-what%E2%80%99s-different-and-why-it-matters/

Implementing the Fixed Offload figure in the model, results in a baseline for the total weighted average AUPU[60] of 3,32 GB per month as well as the following forecast – reaching 10,57 GB per month in 2030 and 22,27 GB per month in 2040:

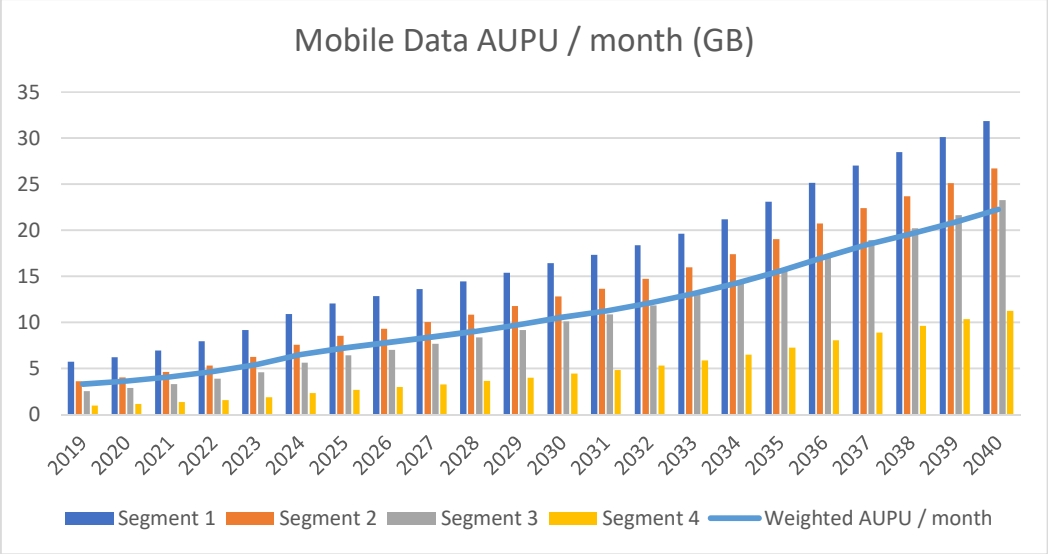

Figure 17: Evolution of the mobile date AUPU per month and per segment

5.2.5 Mobile Substitution

On top of the "standard" mobile data usage, an analysis has been carried out on additional mobile data usage being generated by individuals, primarily in the form of Mobile Substitution.

Mobile Substitution is the potential fixed data traffic which is replaced by end-users using a mobile cellular connection instead (e.g. xDSL replaced with 5G).

The two key categories which arose were the following:

- **Fixed Wireless Access (FWA)**: The process of providing wireless broadband using radio links between two fixed points. In other words, fixed wireless is an alternate method of providing wireless internet access to homes or businesses while eliminating the need for physical connections.
- **Voice over LTE (VoLTE):** Voice traffic which is handled via and considered as mobile data traffic. This approach results in the voice service being delivered as data flows, with no dependency on (or ultimately, requirement for) the legacy circuit-switched voice network to be maintained.

[60] Average Usage Per User

Fixed Wireless Access

Although operators are already experimenting with concepts such as Telenet with Tadaam[61], the current FWA volumes are still neglectable. Therefore, from a baseline perspective, the volume of FWA is set at 0 GB. However, with the rise of 5G, operators are expected to gradually but limited push for FWA. The reason for considering the growth of FWA as neglectable today and only gradual in the next years is twofold:

- Operators are currently still rolling out Fiber-to-the-Home (FTTH) and this will most likely still take several years to be completed. To remain competitive, operators are expected to offer 5G FWA as an alternative for people who are looking for increased internet speeds.
- For homes which are remotely located – primarily in the south of Belgium – and which require high investment costs to reach with FTTH, it has been presumed that operators will offer 5G FWA as an alternative to avoid this cost.

The mobile data volume generated from FWA has been determined as a substitution percentage of Fixed Residential Broadband traffic. The volume is assumed to continue growing at a steady rate of 3,53% year-on-year, based on historical data. With the rise of 5G, we assume that FWA will gradually increase to 5% of total Fixed Residential Broadband traffic by 2029. A 5% maximum is set due to several sources stating that FWA penetration in Western Europe[62] and in Belgium will remain relatively low as Fixed penetration as well as population density is quite high – therefore, facilitating an easier FTTH roll-out compared to other countries.

VoLTE

Based on input from BIPT, it was established that the amount of VoLTE traffic today is still neglectable and has therefore been baselined at 0 GB. However, all Voice traffic is expected to move to VoLTE over time. The computation and forecast of the total amount of voice-capable handsets (i.e. smartphones and feature phones) has been detailed earlier. Similarly, the total amount of Voice minutes per year has been calculated based on average minutes per handset user (i.e. 1632,81 minutes; input received from BIPT). VoLTE has been presumed to be introduced in 2020 and, as a percentage of traditional Voice traffic, will gradually increase – reaching 100% of Voice traffic by 2036. The generated mobile data volumes are very low for VoLTE as its average throughput equals to 0,0025 MB/s (input received from BIPT). However, VoLTE has been taken into account within the model due to its impact on revenue arising from its potentially high mark-up in terms of pricing, what will be explained later in this document.

Total Mobile Substitution

Based on the above, we were able to forecast total Mobile Substitution over the next 20 years:

[61] www.tadaam.be
[62] https://www.ccsinsight.com/wp-content/uploads/2019/02/CCS_Insight_5G_Forecast_Sample.pdf

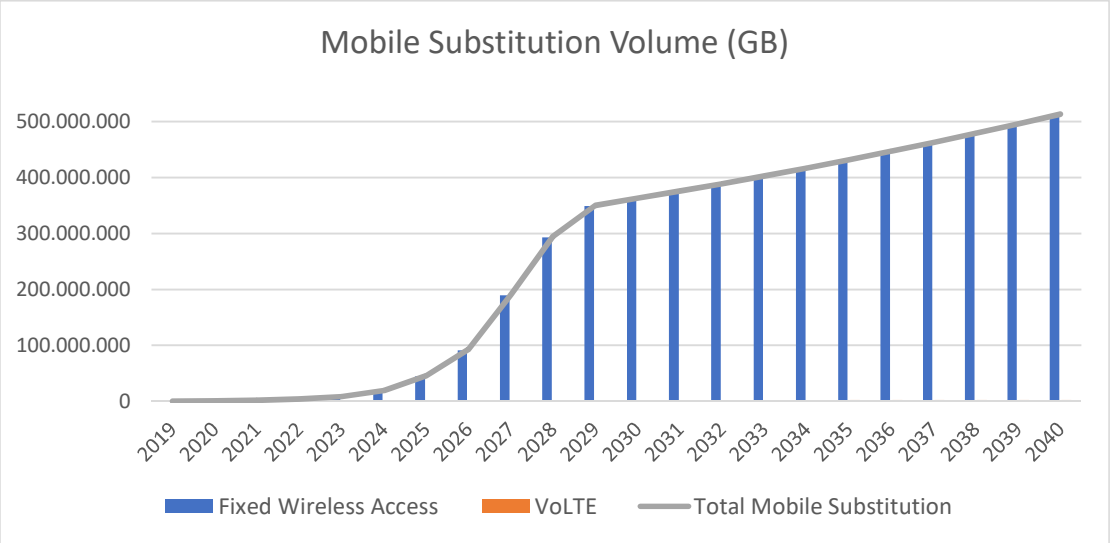

Figure 18: Evolution of the mobile substitution volume

5.2.6 Total Individuals' Mobile Data Volume

When aggregating both "standard" Individuals' Mobile Data Volume and Mobile Substitution, the resulting forecast for Individuals looks as follows:

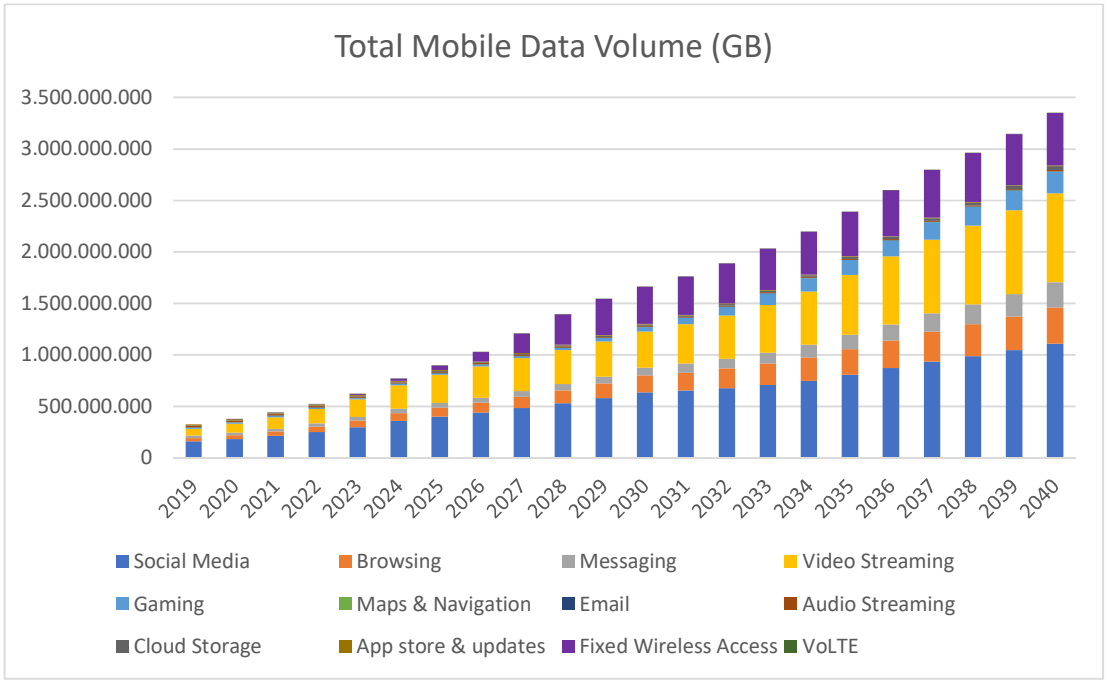

Figure 19: Evolution of the total mobile data volume per service

From a baselining perspective for 2019, the resulting mobile data volume per service of the model is in line with the sanity check performed on the data received from the operators, which validates the baseline. This is highly important, considering the service categories are used to identify the percentage of Media within Mobile Data Volume.

The aggregated Individuals' Mobile Data Volume forecast starts from a baseline figure of 323 million GB, rising all the way up to 3.351 million GB by 2040.

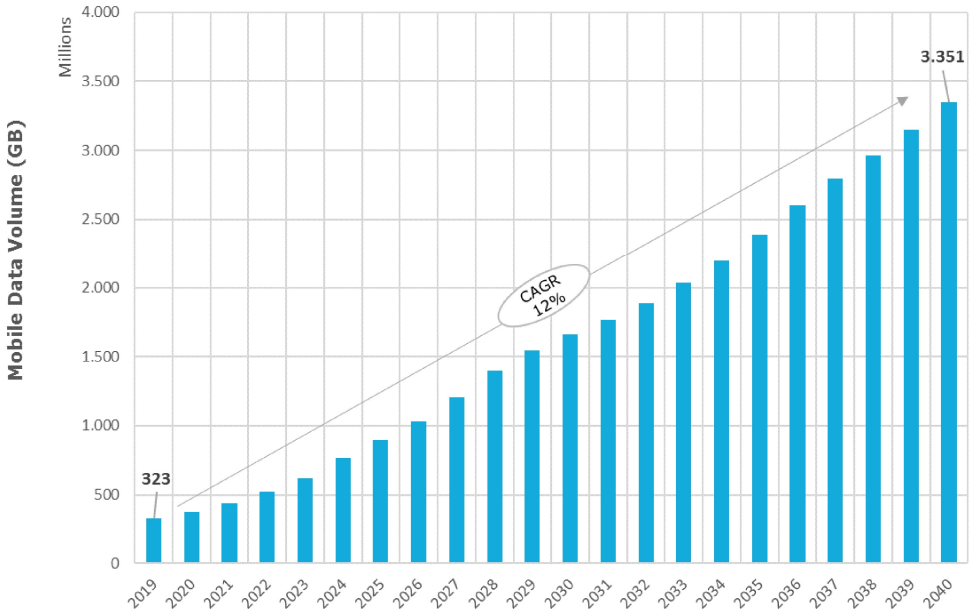

Figure 20: Evolution of the aggregated individuals' mobile data volume forecast

Based on the above forecast, it can be concluded that Individuals' Mobile Data Volume will steadily grow over time reaching tenfold of current mobile data volumes. This is, however, only for Individuals and is not yet taking into account Objects' Mobile Data Volume – which will be discussed in the next chapter.

5.3 Objects

5.3.1 Overview

In order to make a clear distinction between mobile data usage between individuals, objects and mobile versus other connectivity means, Mobile Data Volume of Objects has been defined as follows:

> *"Mobile Data traffic generated by objects (incl. both up-and download) via means of an M2M or IoT subscription, using the Belgian licensed spectrum. International objects roaming in Belgium are included, while Belgian objects abroad are excluded."*

5.3.2 Methodology

For the Objects' component, a different approach has been taken compared to the Individuals' component as Objects is still in its infancy. Therefore, to develop this component, the most interesting verticals and future use cases have been identified.

The research has started by identifying the current amount of M2M objects and its Mobile Data Volume for the Belgium market, based on the different annual operator reports[63,64]. Next, an estimated total Mobile Data Volume has been calculated for those objects. Other current Mobile Data Volume through objects has been identified based on market research and interviews carried out with different industry experts[65]. Overall, we have identified that the Mobile Data Volume is rather limited today for objects as both the number of objects and the average throughput is low.

Finally, based on the M2M generated data volume that has been provided by BIPT in 2018, a sanity check on the baseline value has been applied. All those different inputs allowed to establish realistic assumptions for the baseline.

5.3.3 Identified use cases and verticals

As a first step to shape the model, all the different use cases have been investigated through desk research and interviews with experts on the topic. Once all the use cases were listed, use cases have been clustered and defined under one or multiple verticals. In total more than 100 use cases have been analysed.

This exercise resulted in the identification of the following verticals for connected objects:

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[63] Proximus Group Annual Report 2018

[64] Annual Report Orange Belgium 2018

[65] Interviews with equipment providers, operators, equipment resellers, Capgemini Invent Market Unit leads, industrial organizations

1) Automotive : The *Automotive* vertical covers cellular enabled cars, trucks and all related smart digital hardware and software used in those cars and trucks to enable technologies such as telematics, safety, in-vehicle infotainment within the car.
2) Energy and utilities: The *Energy and utilities* vertical includes the digitalization of all production, transportation, distribution and storage of electricity, water and gas. It covers software (e.g. systems for monitoring and analysis of grids and pipelines) and hardware (e.g. smart meters, outlets) used by the firms and managed infrastructure (e.g. smart grids).
3) Manufacturing and Warehouses: The *Manufacturing and Warehouses* vertical includes digitalization of hardware (such as robots, machinery and other equipment) within a factory and warehouse as well as for the manufacturing supply chain, all related logistic processes and to/from adjacent suppliers/customers. It also includes smart software, user applications and IT systems used by manufacturing firms and specific smart devices used for manufacturing applications (such as 3D printing). All forms of manufacturing players are included (high tech, basic consumer goods, etc.)
4) Smart Cities: The *Smart Cities* vertical covers all related safety and security systems and applications in public settings and smart cities covering surveillance and monitoring, id-management, cybersecurity and other hazard detection / prevention applications.
5) Transportation: The *Transportation* vertical includes all related digitalization applications used in public transport modes (trains, buses, trams) including vehicle telematics, safety, tracking applications and tools for managing traffic and communication. It also includes systems and devices for commuter usage (e.g. information services, ticketing, fare collection system) and the safety and security systems and applications that are being used in transportation settings (e.g. smart security cameras).
6) Broadcasting and Entertainment: The *Broadcasting and Entertainment* vertical covers the digitalization of the entertainment industry. This includes the objects (mainly cameras) that are being used in sport infrastructures or by companies who enable the production of live broadcasting. It also covers applications and systems in advertising such as smart billboards.
7) Agriculture: The *Agriculture* vertical includes everything digitalized related to cultivation, breeding and managing on a farm. This implies devices focused on field monitoring and mapping conditions in the farm and its surroundings. It also contains applications for livestock monitoring.
8) Logistics: The *Logistics* vertical includes the digitalization of fleet management tracking, goods transportation tracking and monitoring of logistic operations to provide more visibility within transportation and associated logistic processes such as shipping, dispatching and picking. This includes all sensors, applications and hardware that contribute to the overall operating efficiency of logistic tasks.
9) Healthcare: The *Healthcare* vertical encompasses digitalization of hospitals and private healthcare providers and related patient health applications. This includes specific applications for patients and consumers (such as precision medicine, smart beds and fitness trackers), user applications and systems within the hospitals (such as telesurgery and applications for the connected ambulance) and systems for managing medical data and analytics (such as electronic health records and clinical support systems).
10) Data Transport: The *Data transport* vertical covers the conveyance of data between systems as main line or as backup line. Currently this transport is handled mainly via fixed lines, except for some backup lines with reduced bandwidth needs. This vertical includes also the temporary lines that are installed for a limited time period to support events or ad hoc needs.
11) Retail: The *Retail* vertical encompass digitalization for retailers that drives value in the form of enhanced customer experience, operational efficiency and promotion offers. This includes

smart in-store devices such as smart scanners, virtual shopping, smart personalized offerings and systems for automating the daily operations such as automatic shelf management and applications based on big data and analytics.

12) Home: The *Home* vertical covers digitalization of home automation, security, communication, entertainment and healthcare. This includes apps, devices, sensors, tools and platforms that enable the household inhabitants and individuals to improve their personal life experiences, to control and monitor the home remotely as well as within.
13) Financial Services: The *Financial Services* vertical covers digitalization of banking, investment services and insurance businesses. This covers IT systems, software's and applications used within and between the firms and the customers such as digital wallets, mobile trading, customer spending analytics and cloud solutions.

It is important to note that only use cases have been retained that already exist today or have a high likelihood to be implemented in the near future. The outcome of this exercise has been determined through extensive market research, Capgemini studies and interviews carried out with different industry experts which will be elaborated on in each section per vertical. Use cases which are today too hypothetical and/or where there is very limited or no research available have not been taken into account in the model.

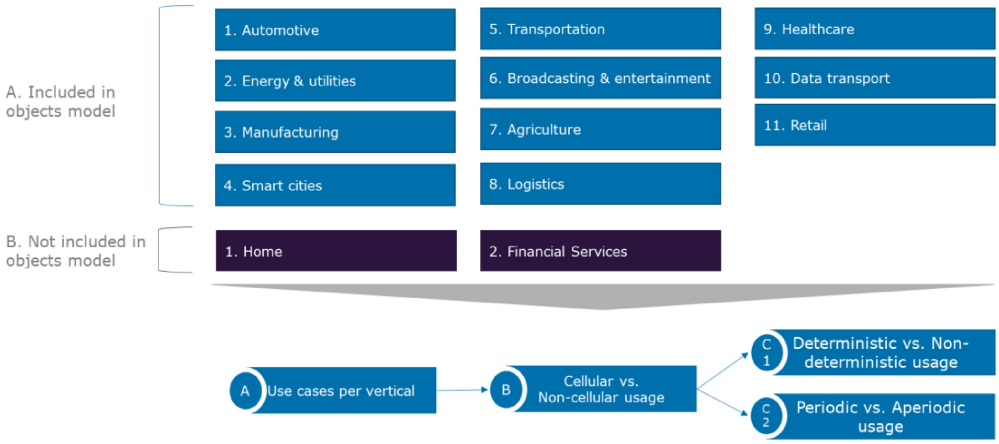

Figure 21: Identification of verticals and use cases for Objects' approach

For each use case an assessment has been performed to identify through which mean the Data Volume has been generated, either through 1) cellular, 2) other connectivity technologies (e.g. Wi-Fi, LPWAN) or 3) both.

Use cases where Data Volume would exclusively happen through other connectivity technology have been excluded from the model. All the other use cases, based partly or completely on cellular technology have been incorporated in the Objects' model, with the exception of these cases where data conveyance is likely to happen through a personal device rather than the object itself (e.g. wearables that are linked to the mobile device). In the latter case, the generated data are already included in the Individuals' model and therefore not included in the Objects' model, to avoid double counting.

The verticals 'Home' and 'Financial Services' have been excluded as those didn't fall under the requirements as described above. The conveyance of these data will either happen through other

connectivity technology or in case of mobile data usage via a smartphone. In the latter case, it means that it has been included in the Individuals' model instead.

On the remaining verticals and use cases, an assessment has been executed to identify the magnitude of each use case. For each use case, the following 3 elements have been determined:

1) Categorization of the average Data Volume of a use case based on the application
2) Determination per use case if the Data Volume is periodic or aperiodic
3) Definition on a use case level if the Data Volume is deterministic or non-deterministic at any given moment

The generated volume of the use case depends mainly on the applications (video, data transport, sensors and steering) or a combination of applications and the number of connected objects using these applications.

This assessment has resulted in the following vertical and application mapping:

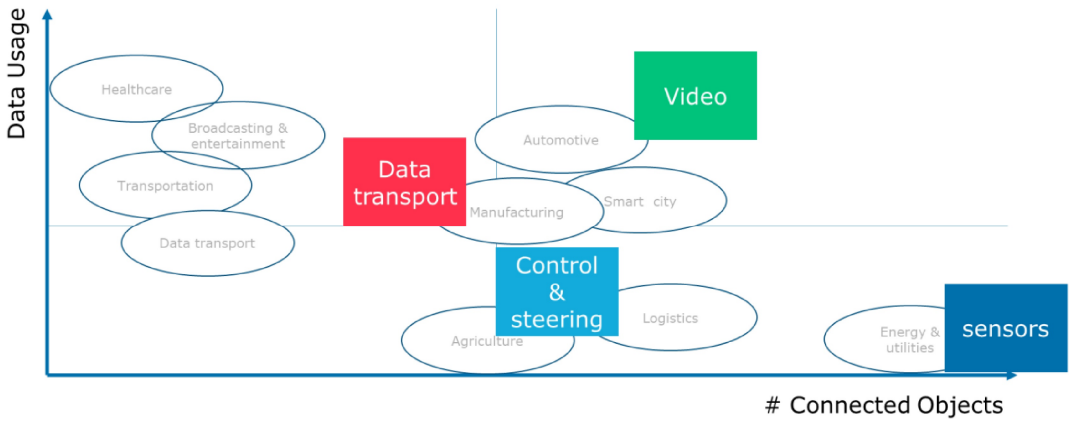

Figure 22: Use case assessment on data usage and connected objects

The Data Volume is mainly impacted by the used application. Sensors will generate rather a limited amount of data followed by control & steering. Data transport and especially video will generate the biggest amount of data usage per connected object.

5.3.4 Volume results

In order to identify the Data Volume per use case or the volume for a cluster of use cases, the number of connected objects and the average throughput per use case or cluster has been computed. Beside those two factors, the cellular adoption rate has also an impact on the Mobile Data Volume. For certain use cases a combination of connectivity technologies could be put in place. This is mainly the case for verticals where other connectivity technologies are already present. In those cases, a gradual year-over-year uptake of cellular connectivity has been foreseen. As already mentioned above, use cases where objects are solely connected through other connectivity technologies have not been considered.

The approach and detailed explanation per vertical are provided hereunder.

Automotive

For the *Automotive* vertical, the main parameters to determine the generated total data are the number of connected vehicles and the average throughput for those connected vehicles.

- The number of connected vehicles has been determined based on the following:
  - The number of cars on the road in Belgium, measured on the 1st of August 2019[66];
  - The number of trucks on the road in Belgium, measured on the 1st of August 2018[67];
  - Other transportation means such as public transportation, buses have been considered in the *Transportation* vertical and are not included in the *Automotive* vertical;
  - The growth of vehicles has been calculated based on historical growth rates;
  - The percentage of connected cars today and in the coming years. According to a Capgemini Invent study[68], about 8% of the cars were connected on a worldwide level in 2018 and a strong growth is expected in the coming years. In 2023, it is expected that 24,2% of the cars will be connected. The YOY growth rates for both trucks and cars have been calculated based upon those numbers as well.

- To compute the average Data Volume per vehicle per year, the following elements have been taken into consideration:
  - The Mobile Data volume that is generated today in connected cars and trucks is rather limited;
  - The amount of time spent in cars as defined in the Individuals model and the amount of time spent in trucks[69];
  - In the coming years, a lot of data will be generated in the vehicles, but not all data will be up- or downloaded to/from the cloud. Following elements are influencing the model:

    1) A part of the data will retain in the car as there will follow immediate actions from the car without any need to upload and/ or analyse that data in the cloud[70];

    2) Another part will require upload but this will not happen through the vehicle as such and therefore it has not been considered in the Objects part (e.g.

[66] Kamer, L. (2019), Number of passenger cars on the road in Belgium from 2008 to 2019. https://www.statista.com/statistics/611473/number-of-passenger-cars-on-the-road-in-belgium/
[67] Kamer, L. (2018), Number of trucks on the road in Belgium from 2006 to 2018. https://www.statista.com/statistics/895009/number-of-trucks-on-the-road-in-belgium/
[68] Capgemini Invent (2019), 'Connected vehicle trend radar'.
[69] European Union, 'Chauffeurs'. https://europa.eu/youreurope/business/human-resources/transport-sector-workers/road-transportation-workers/index_nl.htm
[70] Cisco (2019), 'The Driven Hour'.

vehicle infotainment where data upload and download has been considered in the Individuals' part in order to avoid double counting in the model);

3) Certain data in the *Automotive* and *Transportation* vertical will not be transferred via the cellular enabled network but via other means such as the ITS (Intelligent Transportation System) standard. Those standards are based on open, non-proprietary technology and exists within technologies deployed under the ARC-IT framework and make it easier to develop and deploy regionally integrated transportation systems[71].

- In 2030, the full self-driving capability is expected to hit the European market[72]. The arrival of AGV (Automated Guided Vehicle) will have an important impact on the average data consumption for the *Automotive* and *Transportation* vertical. It requires much more communication to the cloud and not only to the vehicle manufacturer or third party vendors but also towards other vehicles, the infrastructure and other road users. It is important to note that not all cars will have the full self-driving capability by 2030. Most cars and trucks will be connected by then but only a very small minority will have the full AGV capability. It will however gradually increase in the years after. This trade-off between full AGV and connected cars has been reflected in the model via the average Mobile Data Volume.

This resulted in the following Mobile Data Volume for *Automotive*:

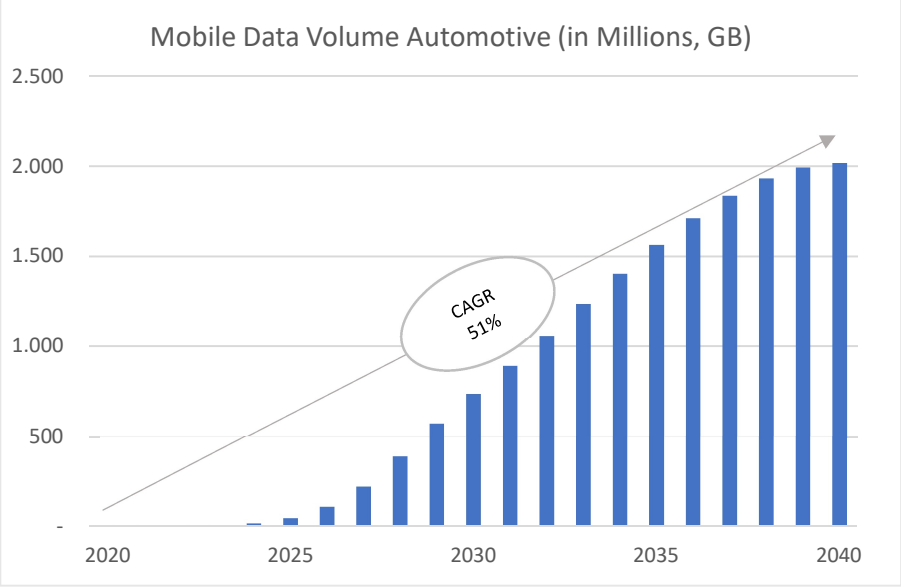

Figure 23: Evolution of the total Mobile Data Volume generated by Automotive

Overall there is a rather limited Mobile Data Volume baseline for 2020, less than 545.000 GB, due to the limited number of connected cars and trucks with a very low average Mobile Data Volume. In 2040,

[71] European Commission, 'Intelligent Transport Systems'. https://ec.europa.eu/transport/themes/its_en

[72] Koetsier, J. (April 2019), 'Self-driving Cars In 10 Years : EU Expects 'Fully Automated' Cars by 2030. https://www.forbes.com/sites/johnkoetsier/2019/04/06/self-driving-cars-in-10-years-eu-expects-fully-automated-cars-by-2030/#141a9f71615b

2000 million GB are expected to be consumed through the *Automotive* vertical which implicates a CAGR (compound annual growth rate) of 51% over the given period.

Manufacturing & Warehouses

For the *Manufacturing and Warehouses* vertical, there are endless use cases. On top, within each use case we found differences based on the specific need for a particular industry and/ or company[73]. Therefore, in order to obtain a helicopter view on this vertical, an approach that defines the average amount of connected objects for a factory or warehouse has been adopted.

The number of connected objects in factories and warehouses has been calculated based on the total number of factories and the warehouses available in Belgium[74]. In parallel, the current percentage of smart production factories[75] has been investigated as well as the year-over-year growth of smart production plant and warehouses. Also, the average size of production plants and warehouses and the number of connected objects per m² today and expected in the years to come have been investigated[76]. This provided the data to forecast the number of connected objects per production plant and warehouse.

For the average throughput per connected object per year, an average has been computed based on the different identified use cases and their data volume.

In addition, in order to assess the obtained volumes and evolution, we analysed the requirements put forward by companies using other connectivity technologies (Wi-Fi, LPWAN, etc.) and the evolution of these technologies versus the future cellular enabled technology.

Based on the above, the total Mobile Data Volume for *Manufacturing and Warehouses* has been forecasted over the next 20 years as follow:

[73] Capgemini Invent Belgium & Agoria (November 2019), 'Time to connect Belgium with 5G, an exhaustive industrial study reveals roadblocks and opportunities'.
[74] Agoria (April 2019), 'The Belgian Factories of the Future approach is conquering Europe: "An additional incentive for companies to start the Made Different process"' https://www.agoria.be/en/The-Belgian-Factories-of-the-Future-approach-is-conquering-Europe-An-additional-incentive-for-companies-to-start-the
[75] Agoria (April 2019), 'The Belgian Factories of the Future approach is conquering Europe: "An additional incentive for companies to start the Made Different process"' https://www.agoria.be/en/The-Belgian-Factories-of-the-Future-approach-is-conquering-Europe-An-additional-incentive-for-companies-to-start-the
[76] Ericsson (June 2018), 'Realizing smart manufacturing'. https://www.ericsson.com/en/mobility-report/articles/realizing-smart-manufact-iot

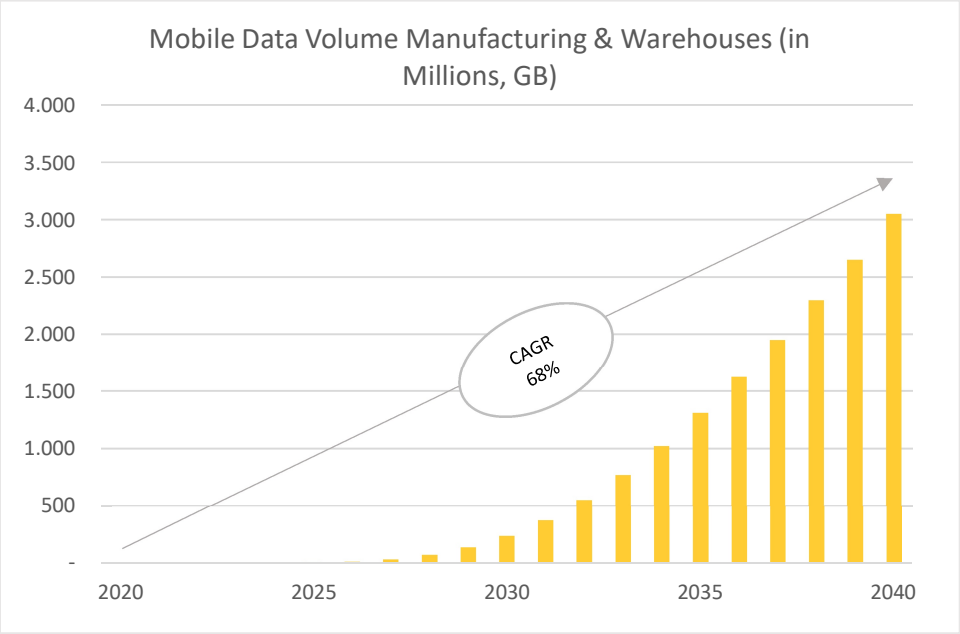

Figure 24: Evolution of the total Mobile Data Volume generated by Manufacturing & Warehouses

Summarized, for *Manufacturing & Warehouses* a very small Mobile Data Volume in 2020 is expected, namely 95.000 GB. Based on a 5G cross-industry study conducted in Belgium by Capgemini[77], all interviewees indicated that 5G has critical benefits compared to previous network generations. However, given the unclear situation in Belgium, they didn't have 5G on their roadmap yet and didn't plan to do so soon. Therefore, those companies are currently using alternative solutions (e.g. Wi-Fi). At the same time, there are big expectations from this vertical towards 5G and the benefits that it will bring, therefor an expected growth with a CAGR of 67,9% in 2040 to 3 billion GB is being expected.

Smart Cities

Through the assessment of the different use cases, we've identified that the *Smart Cities* vertical will be mainly driven by the number of connected sensors and smart cameras. The data throughput of those will variate a lot as explained in figure 21.

To determine the number of smart cameras, it is important to note that all camera surveillance has been considered. Hereby cameras linked to shopping malls, airports, etc. have been analysed. Objects linked to private buildings are not considered as these are, if relevant, included in other verticals such as Manufacturing.

Therefore, the number of places where cameras have been installed[78] has been multiplied by the average number of cameras per location. It is important to mention that still a part of the connected cameras will remain connected through traditional network technologies. Indeed, in certain areas,

[77] Capgemini Invent Belgium & Agoria (November 2019), 'Time to connect Belgium with 5G, an exhaustive industrial study reveals roadblocks and opportunities'.

[78] De Morgen (2017), 'Aantal camera's in België vervijfvoudigt : op ruim 47,000 plaatsen wordt u gefilmd'. https://www.demorgen.be/nieuws/aantal-camera-s-in-belgie-vervijfvoudigt-op-ruim-47-000-plaatsen-wordt-u-gefilmd~b0b88288/?referer=https%3A%2F%2Fwww.google.com%2F

traditional network connectivity will remain available for devices for which the mobile aspect is not a necessity.

The data volume of connected cameras in public places will be on the higher side as upload to the cloud is expected to happen on a continuous basis. The average upload speed for 2019 has been defined based on the recommended upload speed for a resolution of 720 pixels[79]. An evolution has also been foreseen with regards to the upload speed given the fact that video upload quality will further improve to enable important features related to security (e.g. face recognition).

Other connected devices in *Smart Cities* are sensors. The data from those sensors will need to be uploaded to the cloud and analysed in order to take appropriate action (e.g. waste management, parking capacity, traffic management, etc.). Sensors are expected to increase drastically over the common years in order to further facilitate city management. As most sensors have a low throughput, the Data Volume generated via sensors is on the low side.

Based on the above, the total Mobile Data Volume for *Smart Cities* has been forecasted till 2040:

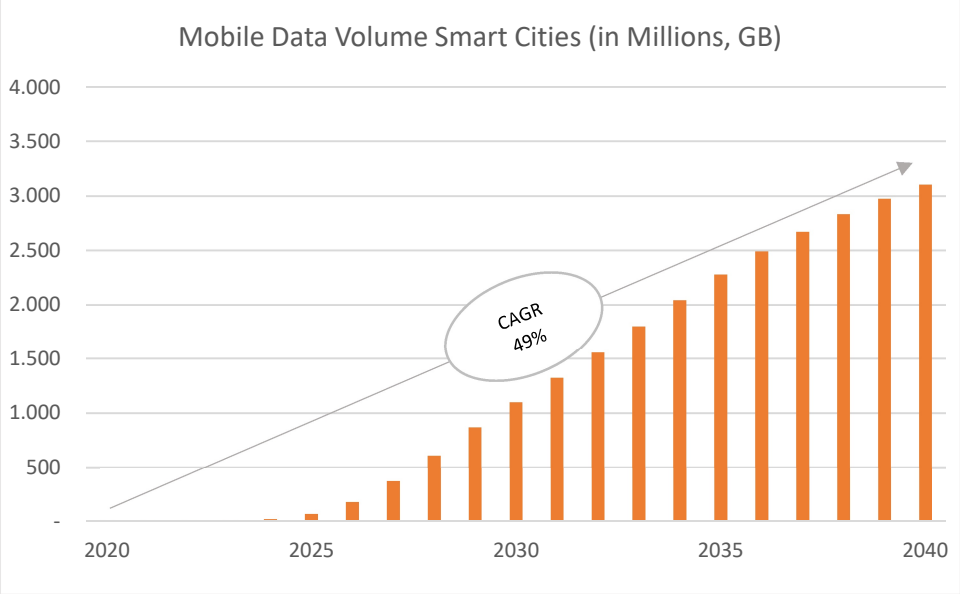

Figure 25: Evolution of the total Mobile Data Volume generated by Smart Cities

For *Smart Cities* a total Mobile Data Volume of 1,1 million GB is expected in 2020 and is expected to grow with a CAGR of 49% to 3,1 million GB in 2040.

Data Transport

The data conveyance of companies is currently for the vast majority ensured by fixed network technology. Also, for backup lines, most lines are based on the fixed network, consisting in most cases of lines with a lower QoS and bandwidth such as VDSL- or cable TV lines. A small percentage is already using 4G connectivity as backup lines to ensure business continuity in case of a network failure. The limitation of 4G as backup line is due to low bandwidths, difficult in-house connection, high latency,

[79] Boxcast (2019), 'What Upload Speed Do I Need To Live Stream ?'. https://www.boxcast.com/blog/what-upload-speed-do-i-need-to-stream

limited QoS, etc . and will be resolved with 5G. As market conditions for 5G will improve, 5G has the potential to become the standard solution for backup connectivity enabling cost reduction on in-house wiring and cable introductions and an increase in flexibility. The fixed network will certainly remain the basis for most of the networks, but the mobile data conveyance certainly will be able to replace temporary leased lines and some lines that are difficult to be installed resulting in high one-time installation costs.

The total Mobile Data Volume for *Data Transport* till 2040 has been forecasted as follow:

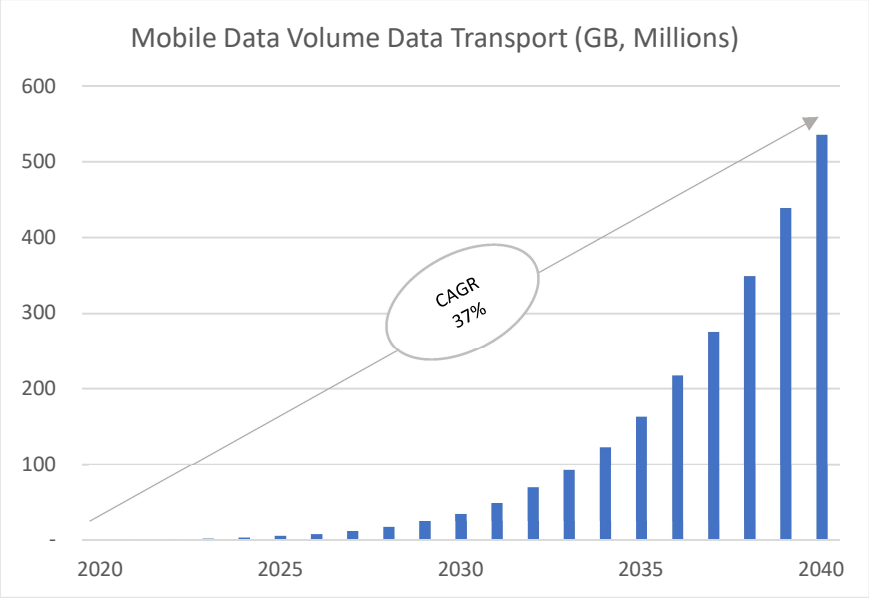

Figure 26: Evolution of the total Mobile Data Volume generated by Data Transport

By assuming a declining price per GB, this application of licensed spectrum is expected to convey 536 million GB in 2040.

Transportation

Connected vehicles such as cars and trucks have already been covered in the *Automotive* vertical. For the *Transportation* vertical, we focus on other vehicle means such as private buses, public transportation and drones.

The total number of connected private buses has been investigated by looking at the total number of buses measured on the road in 2018 in Belgium[80] deducted by the amount of public buses.

The total amount of rolling stock for public transportation has been qualified based on the publicly available figures from MIVB[81], TEC[82], De Lijn[83] and NMBS[84]. Based on that total amount of public

[80] Kamer, L. (2020), 'Number of buses on the road in Belgium from 2006 to2018'. https://www.statista.com/statistics/895001/number-of-buses-on-the-road-in-belgium/
[81] MIVB/STIB (2019), 'Activiteitenverslag 2018'. http://2018.stib-activityreports.brussels/nl
[82] TEC (2019), 'Rapport Annual 2018'. http://rapportannuel.groupetec.be/otw/#le-tec-en-chiffres
[83] De Lijn (2019), 'Jaarverslag De Lijn 2018'. https://www.vlaanderen.be/publicaties/jaarverslag-de-lijn
[84] NMBS (2019), 'Realisaties en kerncijfers 2018'. https://www.belgiantrain.be/nl/about-sncb/enterprise/publications/annual-reports-2018

transportation vehicles, a usage rate of those vehicles has been applied to define the total amount of public transportation vehicles that are on the road daily.

For each of those vehicles, an average time per vehicle has been calculated to estimate how much time each vehicle spends on the road per day.

In terms of Mobile Data Volume, the same average data throughput has been applied for private buses as in the *Automotive* vertical while a difference has been identified for public transportation due to other features for those connected objects (e.g. camera surveillance, ticketing services, etc.). All those elements have been taken into consideration in order to define the average Mobile Data Volume for public transportation.

For drones, the total amount of registered flights in 2018 has been used as a base[85]. The average time spend per flight has been determined, a parameter limited by the battery autonomy. A year-over-year growth rate has been applied on both parameters given the fact that a lot of new drone applications are expected in the future[86] and due to technology improvements, the average battery life of drones will increase.

For the average throughput of drones, the combination of camera and sensor throughput that would be required has been determined for today[87]. A year-over-year growth rate has also been applied given the fact that new technologies will require higher Mbps and 5G will enable higher upload speed.

Base on the above, the total Mobile Data Volume till 2040 for the *Transportation* vertical has been forecasted as follow:

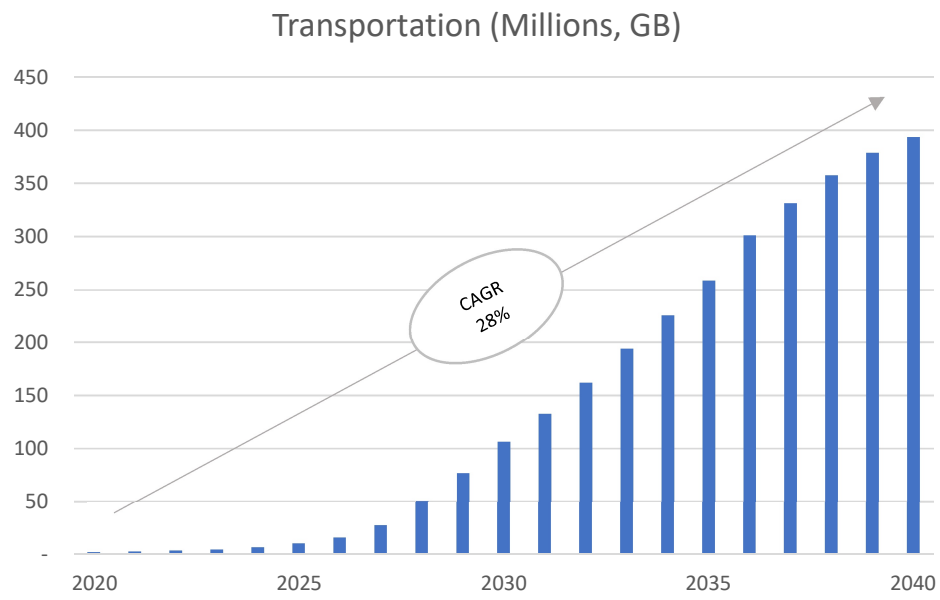

Figure 27: Evolution of the total Mobile Data Volume generated by Transportation

[85] FOD Mobiliteit Belgium (2019), Belgian Civil Drone Council: Kick-off event Brussels. https://mobilit.belgium.be/sites/default/files/resources/files/20190702_clarysse-kris_kick-off_bcdc_presentatie.pdf

[86] Huawei (2017), Connected Drones : A New Perspective On the Digital Economy'.

[87] Sky Drone (2017), 'How much data consumes 4G/LTE streaming of HD video via Sky Drone FVP 2'. https://www.skydrone.aero/blogs/news/how-much-data-consumes-4g-lte-streaming-of-hd-video-via-sky-drone-fpv-2

With a CAGR of 28%, the total Mobile Data Volume for the *Transportation* vertical is expected to grow to 394 million GB by 2040.

Broadcasting & Entertainment

The *Broadcasting and Entertainment* vertical has been defined by out of home advertising, connected cameras in sport infrastructures and video transport for television or other purposes which will be discussed now in detail.

1) Billboards

It's expected that more and more billboards will be connected via a cellular network in order to automatically update commercials from a distance.

To calculate the total amount of connected billboards, the total amount of billboards has been examined based on the public data available from the main billboard providers in Belgium[88,89]. Considering the year-over-year growth of billboards and the fact that not only billboards but also other commercial displays will be connected to the network, the year-over-year growth for the coming years has been extrapolated.

The average Mobile Data Volume that is consumed today on a monthly per billboard has been determined. In addition, the improving quality of the technology has been taken into account in the model, as this will have an impact on the evolution of the average Mobile Data Volume for this use case.

2) Connected cameras at sport infrastructure

For the *Broadcasting and Entertainment* vertical, cameras used in sport infrastructures have also been identified and modelled[90].Those cameras will allow video recording for different purposes, ranging from sport scouting, allowing friends and family watch sports game from a distance, to video recording for security purposes. The number of cameras has been determined by investigating the total number of sport infrastructures in Belgium and multiplying it with the average amount of cameras placed in sport infrastructures. Once the total amount of cameras has been defined, a cellular enabled ratio has been applied as not all cameras will be connected through the network as some might use other connectivity technologies.

The average throughput speed for 2019 has been defined based on the recommended upload speed for a resolution of 720 pixels[91]. A year-over-year growth rate has also been foreseen given the fact that video upload quality will further improve.

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[88] JCDecaux (2017), 'CIM OOH Studie'. https://www.jcdecaux-belux.com/nl/be/onze-media/bereikmetingen#cim-ooh-studie
[89] Clear Channel (2019),https://www.clearchannel.be/en/clear-channel-belgium/
[90] Interviews MCS and Sport Vlaanderen
[91] Boxcast (2019), 'What Upload Speed Do I Need To Live Stream ?'. https://www.boxcast.com/blog/what-upload-speed-do-i-need-to-stream

3) Video transport

As a first step, the number of cameras that are currently being used for broadcasting purposes by the different media houses in Belgium (e.g. RTBF, VRT, etc.) has been identified for video transport.[92] It has been assumed that there will be international broadcasters coming to Belgium and using cellular data in Belgium and Belgian broadcasters going abroad, using cellular data abroad. Therefore, the cellular data consumption by the international broadcasters has not been included as it will level out the cellular data usage by Belgian broadcasters abroad. Additionally, all broadcast cameras are not presumed to be currently connected through the network, so here again, a cellular year-over-year growth rate has been applied.

As the quality of the recorded video will be on the high side, a high average Data Volume has been applied accordingly. The average recording time per day has also been taken into account in order to define the usage time per broadcast camera knowing that even when a camera is cellular enabled not all recorded time will automatically be uploaded via cellular technology. Indeed, it could be that certain recordings are stored on the device itself and transferred via other technologies at a later moment.

The total Mobile Data Volume for *Broadcasting and Entertainment* has been forecasted till 2040 as follow:

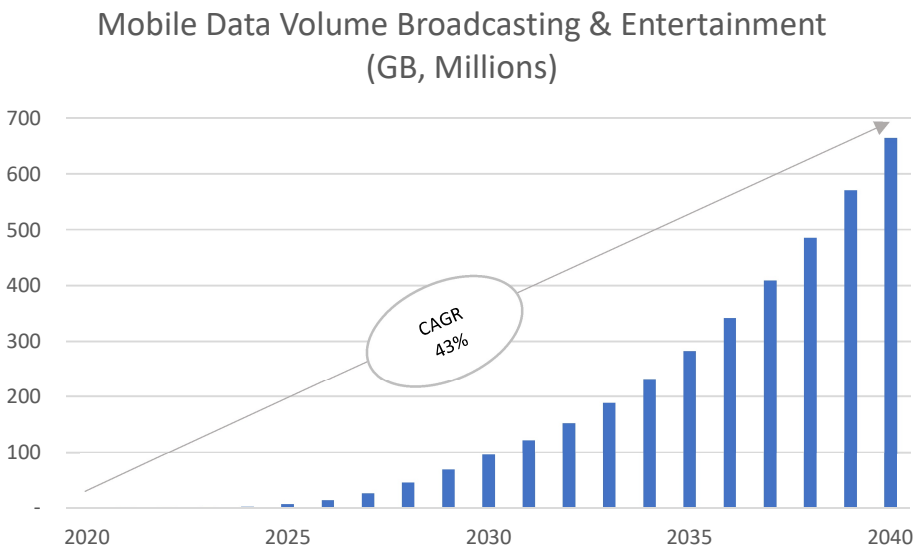

Figure 28: Evolution of the total Mobile Data Volume generated by Broadcasting and Entertainment

With a CAGR of 43%, the *Broadcasting and Entertainment* vertical is expected to generate a Mobile Data Volume of 664 million GB in 2040.

Healthcare

In the *Healthcare* industry there are quite some use cases for connected objects but there are two important comments to make regarding those. First, most use cases are still expected to use other

[92] Vlaamse Regulator voor de Media (2019), 'Rapport Mediaconcentratie 2019'. http://vlaamseregulatormedia.be/sites/default/files/pdfversions/mediaconcentratierapport_2019_zonder_afloop.pdf

(fixed) connectivity technologies instead of cellular technology. Therefore, those use cases are not discussed in the Objects part. Secondly, for certain use cases Mobile Data consumption is not expected to happen through the connected object itself (e.g. health trackers, etc.) but will happen directly through a personal device instead. Again, those use cases are not discussed in the Objects part but are included in the Individuals' model.

Therefore, when looking at the *Healthcare* vertical, it's important to understand that only use cases where the mobility factor is important and where connectivity through Wi-Fi is not feasible have been considered. Cellular data is therefore important for telemedicine where information can already be shared and doctors and nurses can be supported from a distance before the patient arrives in the hospital.

In order to calculate the cellular data usage of this use case, the total amount of interventions performed in Belgium on a yearly basis have been investigated[93]. Based on that number, the year-over-year growth of cellular enabled interventions has been calculated.

The average throughput of a cellular enabled intervention has been determined based on an interview with MCS.

Based on the above, the total Mobile Data Volume for Healthcare has been forecasted as follow:

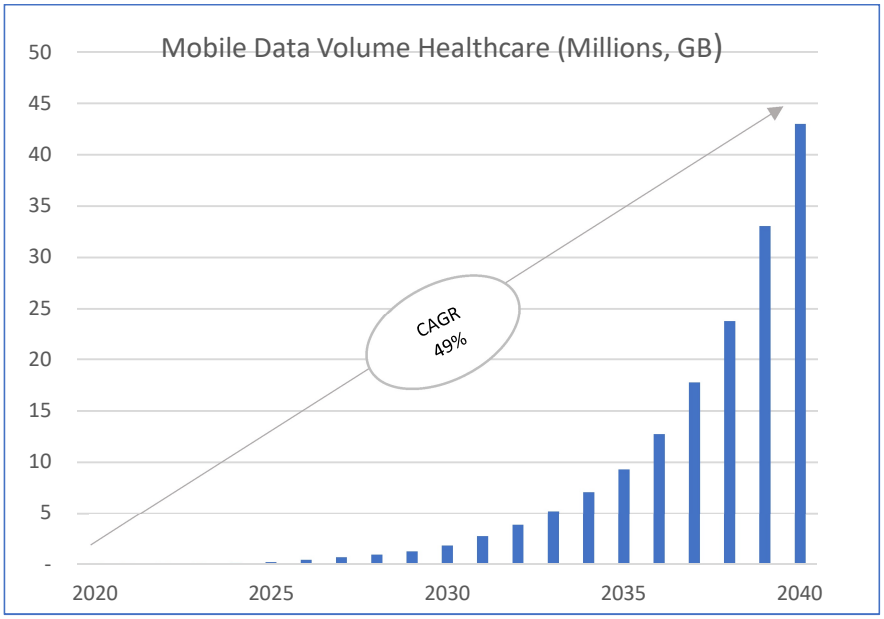

Figure 29: Evolution of the total Mobile Data Volume generated by Healthcare

By 2040, a total Mobile Data Volume of 43 million GB has been forecasted for *Healthcare* through a CAGR of 49%.

[93] Federale OverheidsDienst Volksgezondheid, Veiligheid Van de Voedselketen en Leefmilieu (2018), 'Jaarrapport MUG'. https://www.health.belgium.be/sites/default/files/uploads/fields/fpshealth_theme_file/smureg-smureg-nationaal-jaarlijks-rapport-2017-nl.pdf

Other industries

The other industries have been grouped together as the total Mobile Data volume has resulted in a low outcome compared to the above described industries given the very low average throughput for those verticals.

Logistics

From a logistics point of view, we've identified that the total amount of track and trace objects is already high while the average Mobile Data Volume is very low given that sensor-based applications generate very small data packages. A year-over-year growth for the number of connected objects has been applied.

Therefore, a rather low Mobile Data Volume for this vertical has been forecasted. Over a 20-year period with a CAGR of 8%, the total Mobile Data Volume will grow to 44.000 GB in 2040.

Retail

Based on interviews that have been conducted with different retailers[94], a rather limited amount of use cases that would use cellular data for the Retail vertical has been identified. For indoor usage other connectivity means would still be preferred as use cases are less critical and Wi-Fi could still provide the answer regarding the mobility factor.

5G would still be an enabler to establish more reliable cellular enabled payments and has been identified as a good use case for this vertical. Current cellular network technologies experience network overload during peak season (e.g. Christmas) and Wi-Fi doesn't always offer the stability that is needed during a payment transaction.

To determine the total Mobile Data Volume of this use case, the total amount of point of sale terminal transactions[95,96] in Belgium has been identified and the expected year-over-year growth has been calculated based on historical figures given the fact that less cash payments will happen in the future.

The Data Volume that is generated through a mobile payment is neglectable when you compare it to video surveillance for instance, which explains why the total Data Volume is very low compared to the other verticals.

Consequently, the Mobile Data Volume is estimated at 6.254 GB in 2040 for the *Retail* vertical, which is the lowest compared to all the other verticals.

Agriculture

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[94] Capgemini Invent Belgium & Agoria (November 2019), 'Time to connect Belgium with 5G, an exhaustive industrial study reveals roadblocks and opportunities'.

[95] De Best, R. (2019), 'Total Number of POS terminals in Belgium from 2014 to 2018'. https://www.statista.com/statistics/444522/number-of-pos-terminals-belgium/

[96] De Best, R. (2019), 'Number of payments per capita with cards in Belgium, Luxembourg and the Netherlands (Benelux) from 2010 to 2018'. https://www.statista.com/statistics/606080/number-of-card-payments-per-capita-in-the-benelux-by-country/

For the agriculture vertical, use cases have been identified that will require cellular data usage, i.e. livestock tracking, building monitoring and crop tracking.

1) For building monitoring, we identified the total amount of registered farms in Belgium and an average number of sensors per farm[97].
2) For crop tracking, the total amount of agriculture land in Belgium for crops has been identified and the number of nodes that would be necessary to cover one hectare of land[98]. It could be that multiple sensors are used on one piece of land or that less sensors would be used as complete coverage might not be necessary to track the state of crops, therefore an average number has been applied.
3) In order to calculate the total amount of connected livestock, the total amount of cattle[99] in 2019 has been identified. Hereby, the assumption has been taken that not all type of animals will be tracked given the limited added value that it would provide.

For all those use cases, a year-over-year growth rate has been applied based on available historical data and a cellular adoption rate as certain farmers might still decide not to use IoT and/or use other connectivity technologies instead. The average throughput of the connected objects is rather limited given the fact that the use cases are mainly sensor-based.

Therefore, the Mobile Data Volume for this vertical has been estimated to 110.000 GB in 2040.

Energy and Utilities

In this approach, the number of smart meters that will be installed has been investigated:

- It has been identified that operators currently start to roll out smart meters in Belgium in partnership with energy providers[100] [101]. We assume that other energy providers in Belgium will take the same approach. The assumption that the same initiative will happen for water has been rejected as other technologies might be used instead. The reason behind this assumption lies in the fact that quite some meters are situated underground which will not deliver the expected qualitative measurement results via cellular technology.
- In addition to the smart meter roll out plans of the operators, the total amount of residential units, commercial and other buildings in Belgium has been identified[102], in order to identify the number of connected meters that will be installed beyond 2025. A year-over-year growth rate of those buildings has been extrapolated based on the available historical data .

The average Mobile Data Volume is estimated to stay rather on the low side given the fact that measurements will occur at a maximum every 15 minutes. On top of that, data throughput for sensors are the lowest as depicted in figure 21.

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[97] Statbel (2019), 'Belgische landbouw in cijfers'. https://statbel.fgov.be/sites/default/files/files/documents/landbouw/NL_kerncijfers_landbouw_2019_web.pdf

[98] Statbel 2018), 'Bodemgebruik in België vanaf 1980'. https://statbel.fgov.be/nl/themas/leefmilieu/grond/bodemgebruik#figures

[99] Statbel (2019), 'Voorlopige landbouwgegevens mei 2019'. https://statbel.fgov.be/nl/themas/landbouw-visserij/land-en-tuinbouwbedrijven#figures

[100] Proximus (2019), Annual Report 2018. https://www.proximus.com/investors/reports-and-results.html

[101] VRT (2019), 'Al meer dan 111.000 digitale energiemeters geïnstalleerd in Vlaanderen'. https://www.vrt.be/vrtnws/nl/2019/11/20/al-meer-dan-111-000-digitale-energiemeters-geinstalleerd-in-vlaa/

[102] Statbel (2019), 'Gebouwenpark'. https://statbel.fgov.be/nl/themas/bouwen-wonen/gebouwenpark#figures

Summarized, a Mobile Data Volume of 423.000 GB in 2040 has been forecasted for *Energy and Utilities*.

Based on the above, the forecasted Mobile Data Volume for *Logistics*, *Energy and Utilities*, *Retail* and *Agriculture* has been forecasted as follow:

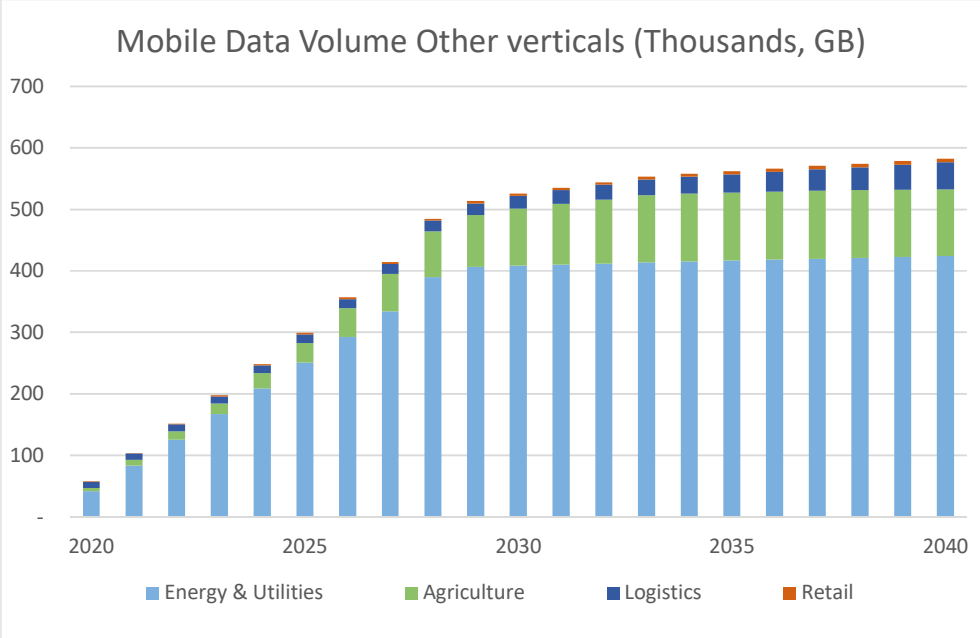

Figure 30: Evolution of the mobile data volume generated by Logistics, Energy and Utilities, Retail and Agriculture

With a CAGR of 12% a total Mobile Data Volume of 583.000 GB is expected in 2040 for those verticals.

5.3.5 Total Objects' Mobile Data Volume

When aggregating the Mobile Data Volume of all the different verticals, the forecast for Objects till 2040 looks as follow:

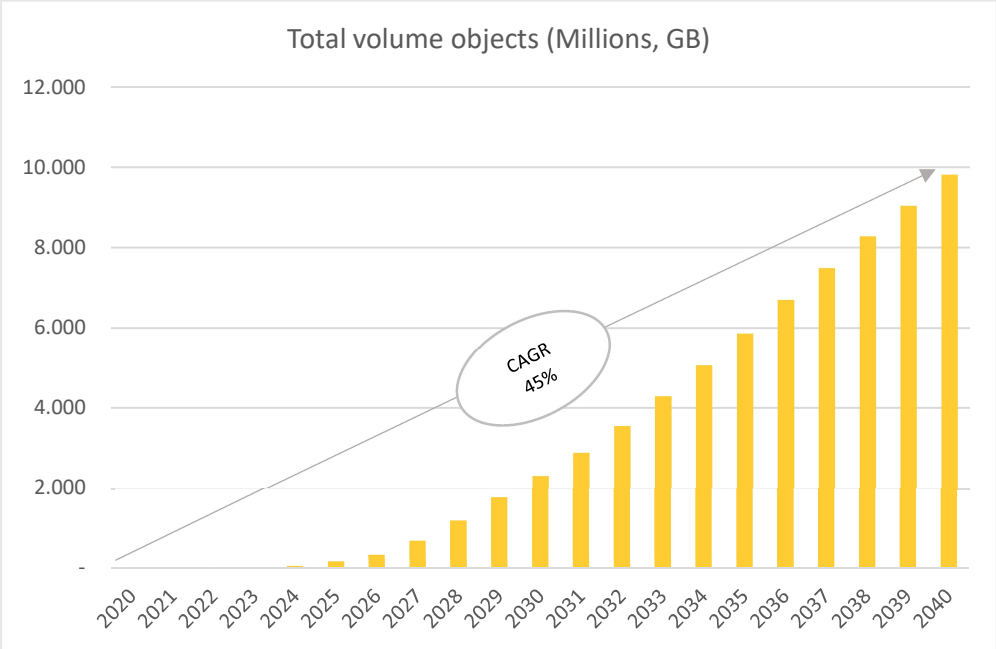

Figure 31: Evolution of the total data volume generated by objects

The aggregated Mobile Data Volume generated for Objects starts from an initial figure of 6.1 million GB, rising all the way up to 9,8 billion GB in 2040 with a CAGR of 45%. In the forecast, we have translated the international context, in which use cases are mostly investigated, to the Belgian situation considering a 5G deployment as of 2022. In general, we have opted for a conservative approach when forecasting the take-up of use cases as not all features of 5G will be available at the beginning of the commercial launch of 5G.

5.4 Aggregated Results

The aggregated total Mobile Data Volume forecasted by the model results in the following volume per year:

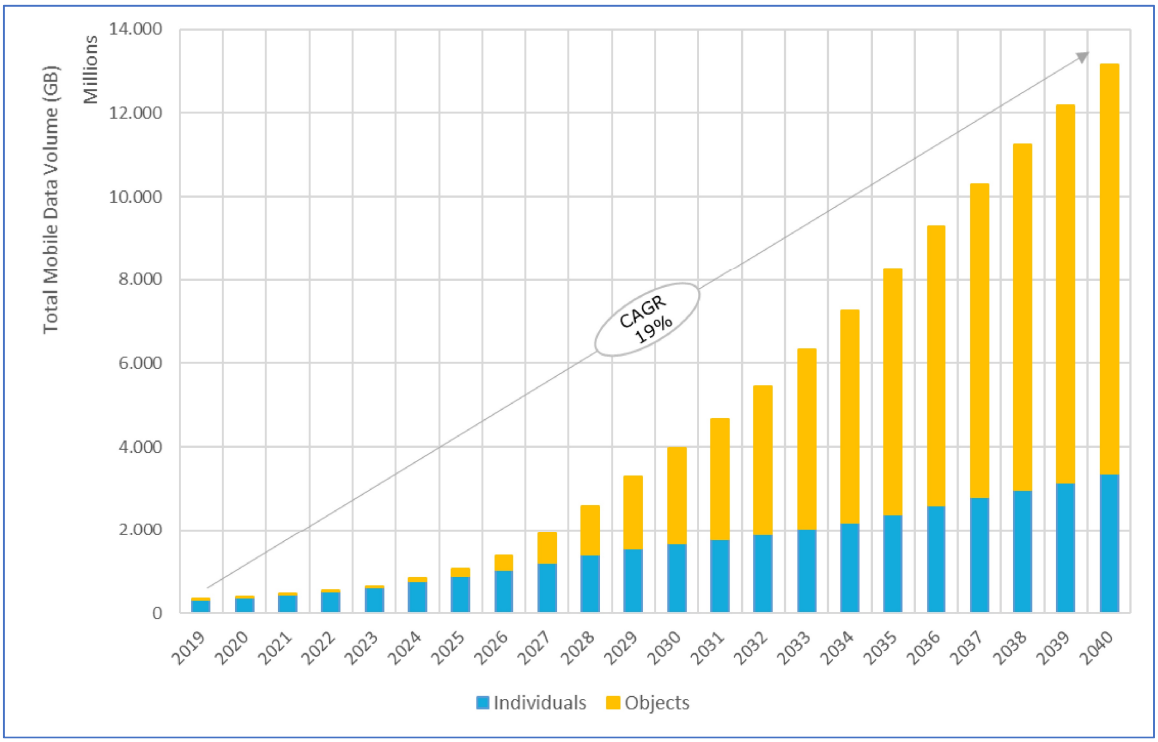

Figure 32: Aggregated total mobile data volume forecast for objects and individuals

The Total Mobile Data Volume grows over 20 years from 327 mio GB to more than 13 billion GB. The Mobile Data Volume of Objects will overtake Individuals' in 2029 and increases rapidly over time, Over the period from 2019-2040 the weighted average of mobile data volume generated in the Individuals part is 34% versus 64% for the Objects part.

6. REVENUE

To determine the revenues generated by the Individual and the Object model a different approach has been developed a market and pricing dynamics are different and are expected to have varying evolutions.

6.1 Individuals

6.1.1 Overview

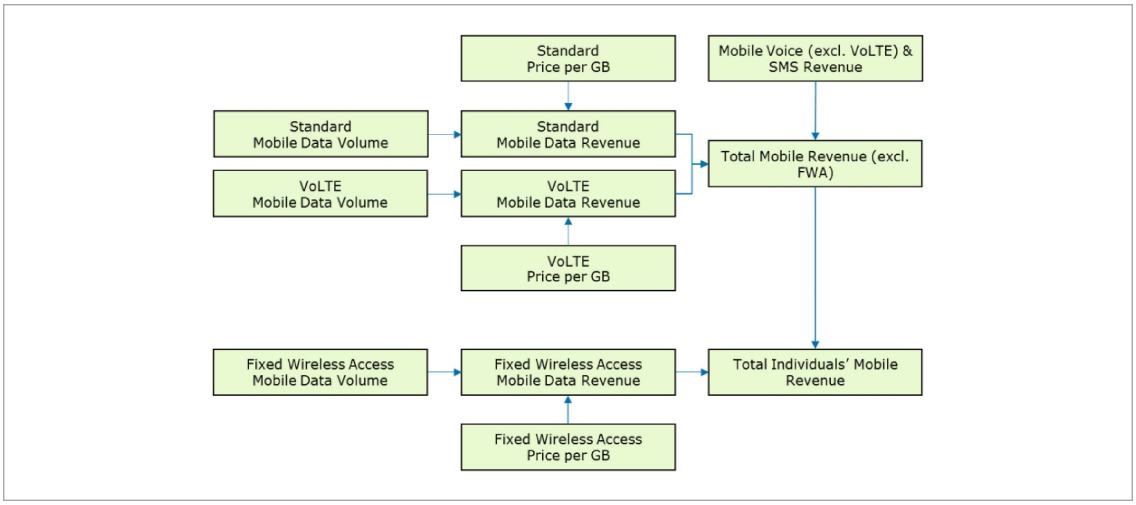

Figure 33: Computation of total individual mobile revenue- Flowchart

The relevant tariff has to be linked to the different identified types of Mobile Data Volume. A top-down-approach, to determine an average price per GB, has been applied to deal with the complexity of Mobile Revenue. Current pricing schemes are a mixture of data, voice, SMS, TV,… and consist of package deals, free-of-charge apps, unlimited tariff plans,…. . All these elements need to be filtered out to come to the mobile data tariff.

A key assumption in this context is that total mobile revenue (excluding Fixed Wireless Access) will remain constant over time. It is also important to note that, due to its current importance, mobile voice and SMS revenue is also included in the model. Hereafter, the logic behind this is explained in more detail.

6.1.2 Mobile Data tariffs

6.1.2.1 Standard Mobile Data tariff and revenue

To link the relevant Mobile Data Volumes to Revenue, the model incorporates a standard price per gigabyte (GB). Historical data on the 3 MNOs (provided by BIPT) allowed to calculate the current price per GB. The logic behind standard price per GB can be found below:

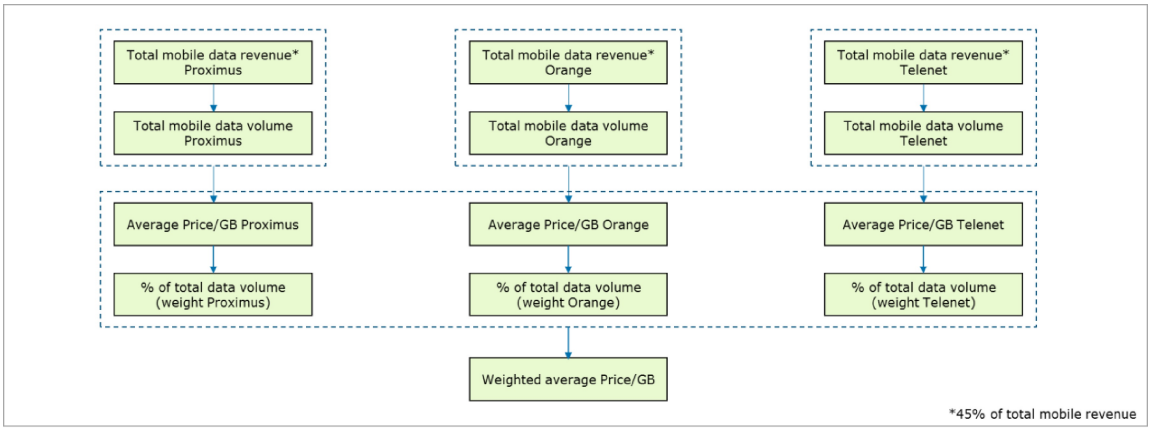

Figure 34: Computation standard mobile data tariff - Flowchart

As 45% of mobile revenue was generated by mobile data (for usage as defined in the Individual model) in 2018, the mobile data revenue of each operator for all market segments was identified. Dividing this by the total mobile data volume of each operator, enabled to extrapolate an average price per GB per MNO. With the percentage of total mobile data volume per operator in mind, the weighted average price per GB for Standard Mobile Data was calculated. Based on historical data, the price reduction per GB was extrapolated, resulting in the baseline figure for 2019: €5,47 per GB.

Following the trend of the last few years, the standard price per GB is expected to continue to decrease over time. We do not see a potential increase of the tariff (or a stabilisation) as the current mobile data tariffs are perceived as high by the users. Over-the-top players (OTT) are also addressing the same (limited) budget of the end-users to offer, amongst others, access to on-demand audio- and video-streaming services. In addition, a potential mark-up for 5G features will in first instance be absorbed by the equipment providers who at this moment are asking an additional €200 for 5G enabled devices. We expect in the next years that the operators will mitigate between pricing and volume to obtain a stable average revenue per user (ARPU). In a later phase additional quality- and service packages will be leveraged to compensate for the fact that mobile data will become a commodity. This assumption is also supported by other studies[103].

Over a period of 20 years we expect that the Standard Mobile Data tariff for end-users will go down from €5,47/GB to €1/GB.

6.1.2.2 Mobile Voice & SMS Revenue

[103] Arthur D.Little, 2019, Acing 5G pricing.

With the rise of mobile data, the importance of mobile voice and SMS revenue within the Total Mobile revenue is decreasing year over year. Based on operator figures, we established a baseline with voice and SMS revenues representing 52% of Total Mobile Revenues.

Considering the increased substitution by OTT messaging apps (i.e. via mobile or fixed broadband) as well as the introduction of VoLTE, the percentage of Mobile Data Revenue compared to Total Mobile Revenue is assumed to increase with 3% each year and reach 100% of total Mobile Revenue by 2037. This implies that, according to the model, mobile voice & SMS will have completely disappeared by that time.

6.1.2.3 VoLTE Mobile Data tariff and revenues

At this moment mobile voice is an important revenue generator for the MNOs. Also, when the traditional voice is replaced with VoLTE, the tariff is assumed to have a significant mark-up compared to mobile data pricing. Considering operators endeavour to secure voice margins, the baseline of the model is currently set at 0,013 EUR per minute (based on wholesale Voice terminating prices including a mark-up). When converting this to a price per GB (based on the earlier mentioned 0,0025 MB/s average VoLTE throughput), a baseline figure of 88,75 EUR per GB is presented. As the VoLTE price is expected to decrease over time, the model uses a mark-up compared to the standard price per GB, which allows it to evolve accordingly. However, since voice pricing is coming more and more under pressure, we assume that this mark-up will gradually reduce over time.

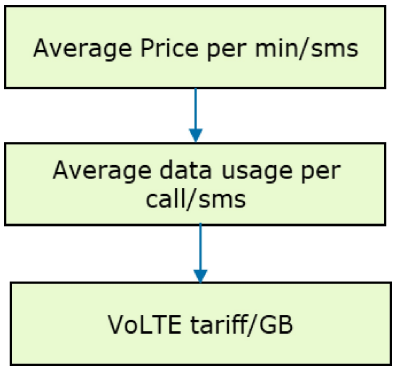

Figure 35: Determination of the VoLTE tariff based on current Voice price/min tariffs

6.1.2.4 Mobile ARPU (excl. FWA)

The Total Mobile Revenue (excl. Fixed Wireless Access) is calculated by aggregating all the different components. As a sanity check, the average spending on mobile telecom per year per person[104] was included in the model. Assuming that indexation[105] has the highest impact on telecom spending, these figures are used as an upper limit for the model.

[104] https://statbel.fgov.be/nl/themas/huishoudens/huishoudbudget#figures
[105] https://www.nbb.be/en/publications-and-research/economic-and-financial-publications/economic-projections-belgium

The mobile ARPU in 2019 is set at €25,8. This could be considered to be relatively high, however, the amount can be explained considering the model only focuses on active end-users and neglects both dormant SIM cards as well as multiple SIM cards per user. Based on BIPT data, SIM penetration (excluding M2M SIM cards) was determined to be 104% compared to total population.

The mobile monthly ARPU shows following stable evolution:

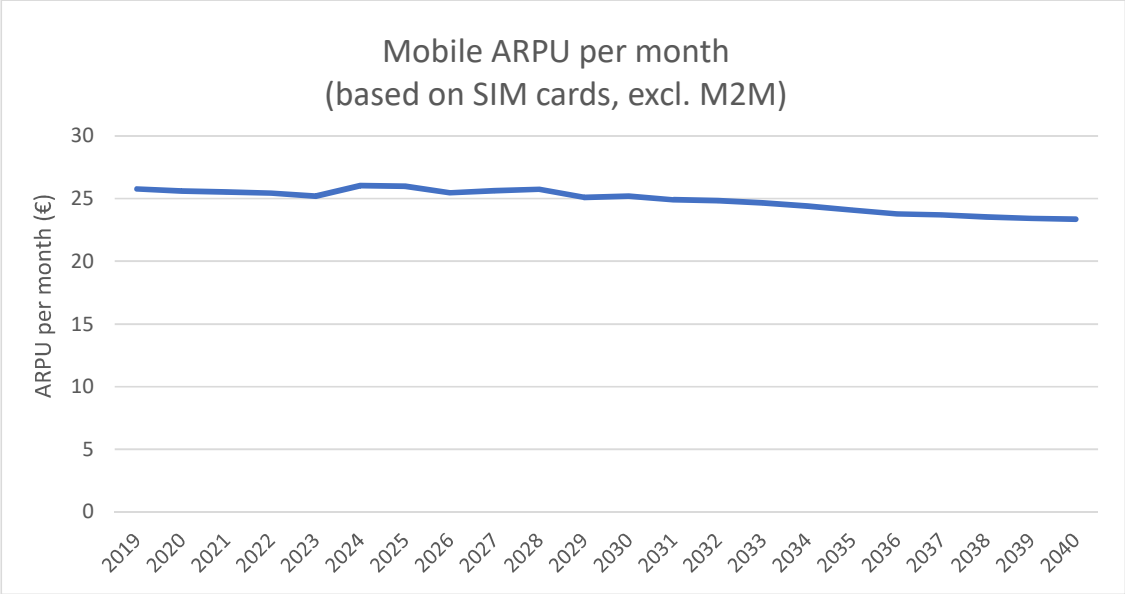

Figure 36: Evolution of the mobile ARPU per month

The mobile ARPU will briefly increase with the adoption of 5G but will slightly decrease in the long term.

6.1.2.5 Fixed Wireless Access (FWA)

For the Fixed Wireless Access price per GB, the average price per GB of Fixed Broadband was first considered, which ranges around 0,20 to 0,25 EUR per GB. Based on existing FWA cases in the Nordic countries, it is presumed that FWA will start off with a mark-up of around 400%. This implies that, at first, FWA pricing will start at 1 EUR per GB and will decrease over time relative to the Mobile Standard price per GB. As the Mobile Standard price per GB decreases further, it is expected that the difference between these tariffs gradually diminishes over time. Nevertheless, operators will try to differentiate FWA from standard mobile usage, therefore FWA is in most cases only offered location based.

Based on the FWA price per GB as well FWA volume, the model provides a forecasting of the FWA Revenues over time.

6.1.2.6 Tariff evolution

Based on the above, the Individual model incorporates the following tariffs and tariff evolution for each component:

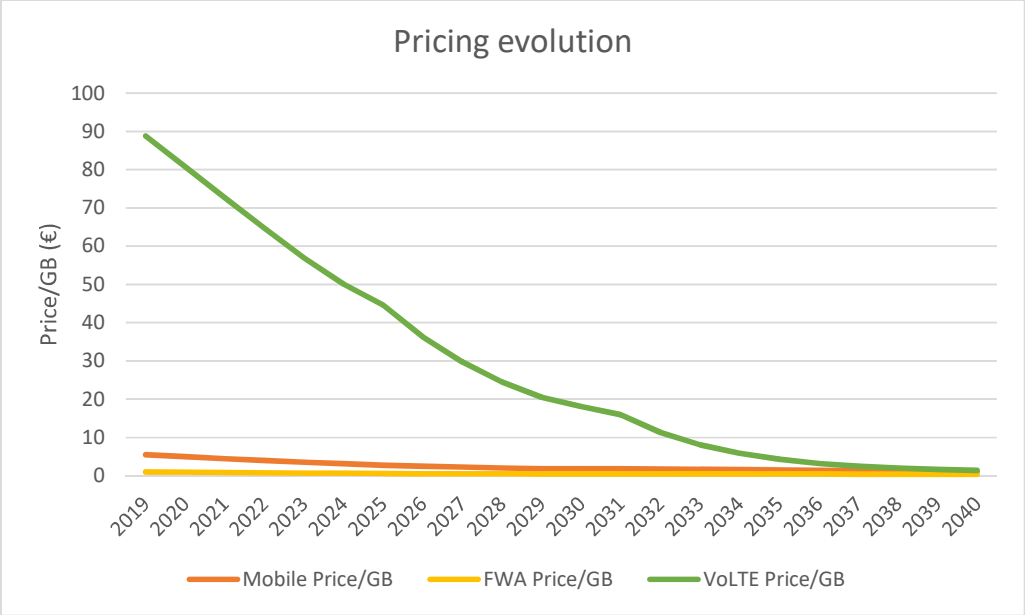

Figure 37: Evolution of the tariffs for individuals

Each price per GB will steadily decrease over the next 20 years as current data usage grows and additional usage is introduced.

6.1.3 Total Individuals' Mobile Revenue

The pricing combined with the respective volumes provides the following Individuals' Mobile Revenue forecast:

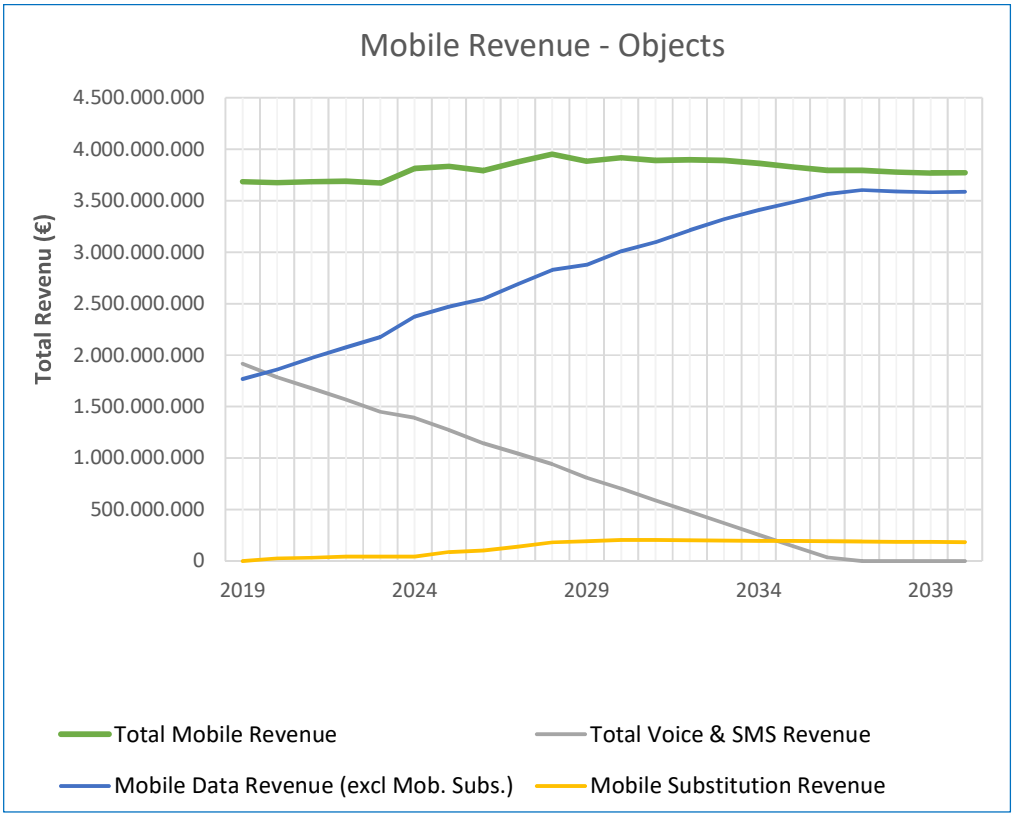

Figure 38: Evolution of the mobile revenue split

The decrease in Voice & SMS Revenue will be offset by the increase in both Mobile Data Revenue and Mobile Substitution. It is, however, important to understand that the revenue generated from Fixed Wireless Access is in fact a proportion of fixed broadband revenue which is moved to Mobile Revenue. Therefore, this could be considered as additional/new mobile revenue.

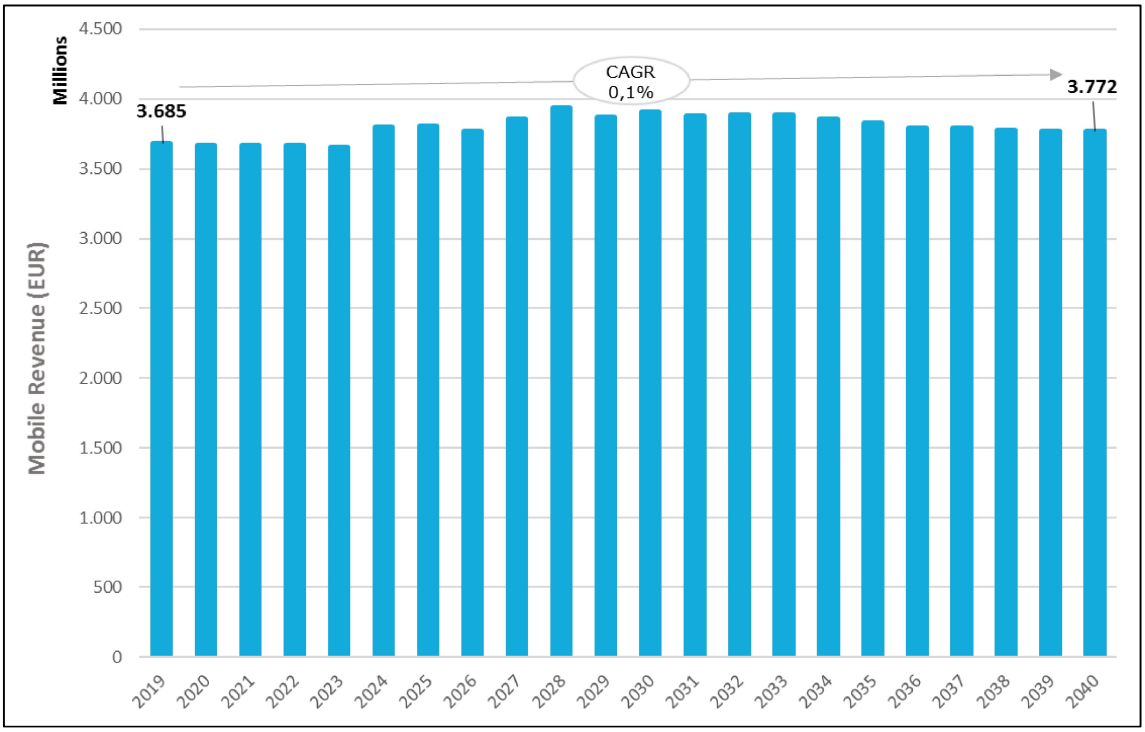

Figure 39: Evolution of the aggregated mobile revenue

With a CAGR of 0,1%, Mobile Revenue will remain roughly constant over time. However, as we also incorporated indexation in our pricing evolution, there is a reduction in value over time of 20% (assuming index growth of 1% each year). With this in mind, we can conclude that Individuals' Mobile Revenue will come under pressure more and more, and additional revenue streams will have to be considered.

An average price of €1,07/GB in 2040 could, considering the increase of mobile data usage, be perceived as high. However, this price per GB is representing the total value of the mobile service of operators and not only the pure data usage. Over the years we expect to see a shift in the mobile tariff plans from a price per GB approach towards a connectivity model. This connectivity model will represent the value of the access to the mobile network and the specific services on that network. The pure data consumption will become only one parameter in an extended service package. In each case, it will be a challenge for the existing operators to ensure stable revenue generation on a product that certainly will become a commodity.

6.2 Objects

6.2.1 Overview

For the Objects model, a standard Mobile Data tariff has been determined and a 5G mark-up has been applied per vertical. The mark-up per vertical has been defined based on different parameters which will be discussed more into detail below. By combining the Standard Mobile Data tariff with the defined mark-up of each vertical and the according volume per vertical the total revenue per vertical, has been determined. Adding the total revenues per vertical resulted eventually in the total amount of revenue for objects (Total Revenue Objects).

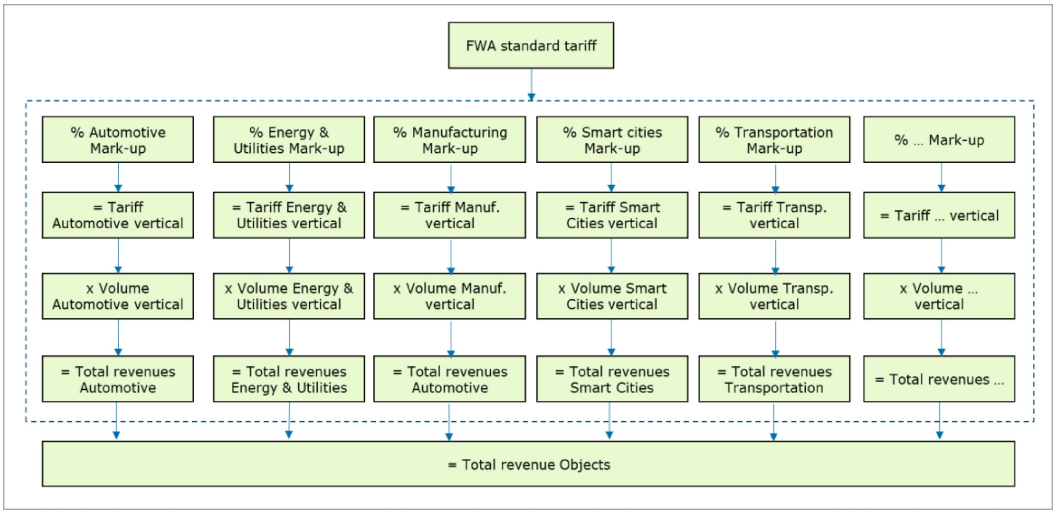

Figure 40: Computation of the total revenue for objects - flowchart

6.2.2 Mobile Data tariffs

6.2.2.1 Standard Mobile Data tariff

The pricing of Mobile Data for Objects is primarily offered within an B2B (or wholesale) context. This implies that prices are not primarily defined at a usage per object but are in many cases based on bulk tariffs. Those bulk tariffs foresee in large data pools from which the users can consume for the different applications available. Based on a pricing benchmark, and by excluding the most extreme cases, a standard price for 2019 of [redacted] has been determined.

6.2.2.2 Mark-up opportunity for Mobile Data tariffs

Currently, the technologies on the licensed spectrum are not offering a solid basis to implement business critical applications upon. This is reflected in the low baseline volumes of the Objects model. With the implementation of 5G this will drastically change. This technology will offer additional

features such as higher bandwidth, massive MiMo[106], a very low latency, the possibility for network slicing, powerful private networks and much higher QoS and related SLAs. As such 5G will become the first mobile business platform that can support all kind of business applications and bundle the different access technologies that are now in a scattered manner used. Mobile operators can use this potential to implement a value-based tariff strategy.

Studies, worldwide[107] and local[108], have identified the demand of the industry for the features that 5G will bring and the willingness to pay a premium fee for it. Based on the raw data of the study 'Time to connect Belgium with 5G' a tariff mark-up has been determined per vertical and per 5G feature considering the specific use cases.

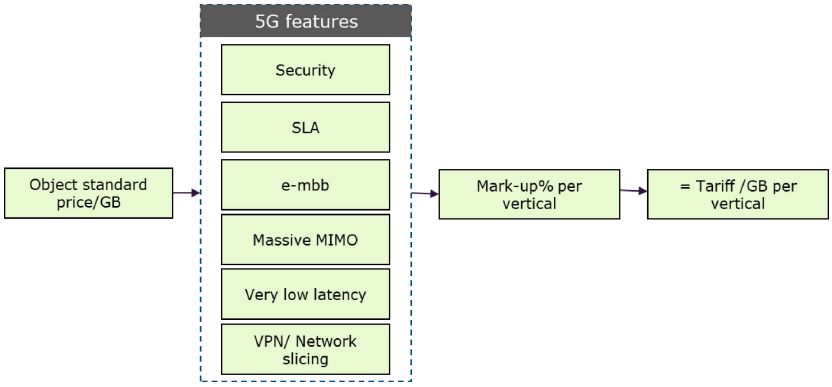

Figure 41: Computation of the tariff per vertical – flowchart

6.2.2.3 Mobile data tariff evolutions

The combination of the standard Mobile Data tariff and the mark-up per vertical has been transposed on the forecasted roll-out schedule from 5G. In this exercise we have considered that not all 5G features are available as from the commercial launch. Several features require upgrades in the backbone network or IT-systems. In addition, it has been assumed that the potential mark-up for 5G features decreases over time due to competition.

With this approach we see important differences in tariff per vertical, especially during the first years. As some verticals are bound to long investment cycles or because some use cases need a full 5G coverage implementation of 5G can be different per vertical.

Other differences can be explained by the nature of the verticals as some will only have a very limited benefit from the different 5G features, whereas others will use a combination of several features.

The following tariff evolutions are used in the Object model.

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[106] Multiple-input Multiple-output

[107] Capgemini Research Institute (April 2019), '5G in industrial operations: How telcos and industrial companies stand to benefit'.

[108] Capgemini Invent Belgium & Agoria (November 2019), 'Time to connect Belgium with 5G, an exhaustive industrial study reveals roadblocks and opportunities'.

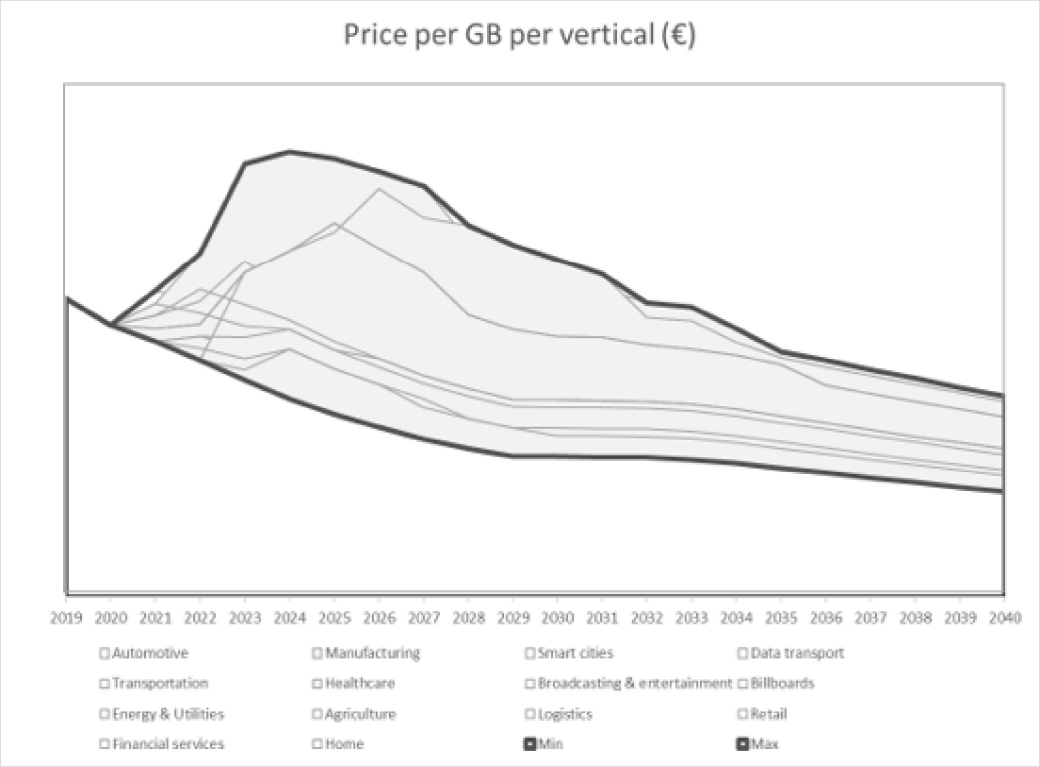

Figure 42: Evolution of the price per vertical

6.2.3 Mobile Data Revenues

By applying the tariffs per vertical, the following Total Object Mobile Data Revenue evolution has been determined.

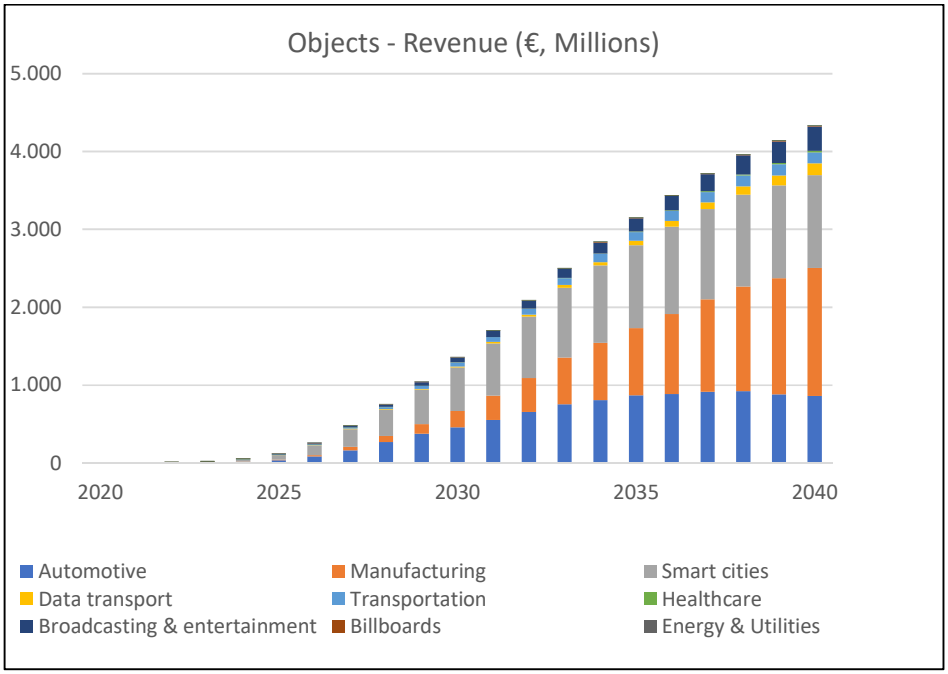

Figure 43: Evolution of the revenue per vertical

Due to the fact that different tariffs have been applied by vertical, the impact has also shifted slightly but the main verticals that generate Mobile Revenue are still Manufacturing, Smart Cities and Automotive (as in terms of Volume). In parallel, the significant take up of the Mobile Data revenues also starts from 2025.

With a CAGR of 40% it is obvious that new revenues, in comparison with the revenue evolution of Individuals, will be generated through Objects, where a lot of potential revenues can be found by operators and other (new) players in the market.

The Total Revenues that are generated through Objects are conservative in our model compared to a study that has been conducted by Ericsson[109]. The main reason of this difference can be found in the delay of the 5G auction. We can't assume a big uptake in both Volume and Revenues in the coming years because companies have no visibility on 5G availability and are only now starting to consider to include this in their digital roadmap[110].

6.3 Aggregated Results

To have a complete view of the Revenue evolution, the Individual and the Object model are merged. The aggregated Total Mobile Revenue forecasted by the model results in the following revenue per year:

[109] Ericsson, October 2019, 5G for business: a 2030 market compass

[110] Capgemini Invent Belgium & Agoria (November 2019), 'Time to connect Belgium with 5G, an exhaustive industrial study reveals roadblocks and opportunities'.

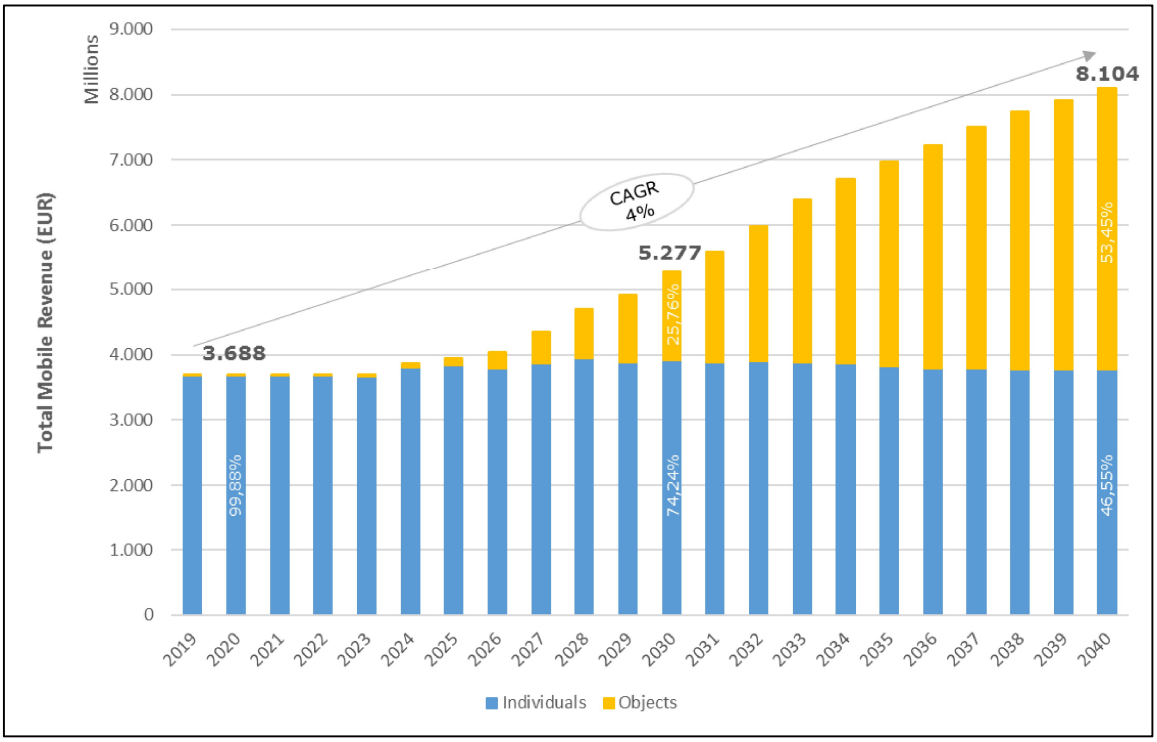

Figure 44: Aggregated results on revenue for objects and individuals

The forecasted revenues demonstrate that Mobile Revenue of Objects only overtakes Individuals' in 2038, leading to a total CAGR of 4% over the forecasted period. Compared to the aggregated Mobile Data Volumes, the growth for Mobile Revenue is relatively low. This is due to the low pricing attributed to Objects.

7. IDENTIFICATION OF MEDIA

To determine the presence of Media in mobile data we had to focus on the Individual model as almost all media content can be tagged in that model. Nevertheless, the Object model has been scanned for potential media content. To calculate the ratio of media content in the Total Mobile Data, all volumes and revenues of both models had to be considered.

7.1 Media in Volume

In the Media baseline model, the media percentage per service category and per approach (to identify Media) has been identified. This has been done by analysing the main media channels and platforms (such as Facebook, Instagram, YouTube) and by attributing these platforms to service categories.

To forecast, the evolution of Media within the several service categories has been calculated based on factors impacting the total media eco-system.

As a basis for the calculation, the individual evolutions of the most important media channels or platforms have been analysed and are then transposed to an aggregated level per service category. This approach ensures that the model is not depending on the success, or failure, from an individual channel or platform but that the overall evolution of data and media consumption in a service category is withheld. Services within a service category can disappear or new ones can arise but we assume that the general trend will stay independent from the individual cases. For instance, the last years TikTok has increased significantly to become a large platform for the younger segment. This has caused a shift from time spent on Facebook and Instagram to Tiktok, however this is not impacting the overall time spent within the Social Media service category as people still have limited time to spent.

7.1.1 Individuals

As previously explained, the total Individuals' mobile data volume per service category is one of the outputs of our model, which acts as a key input to the media versus non-media discussion. It allows to determine a percentage of media within each service category. An overview of the logic can be found below:

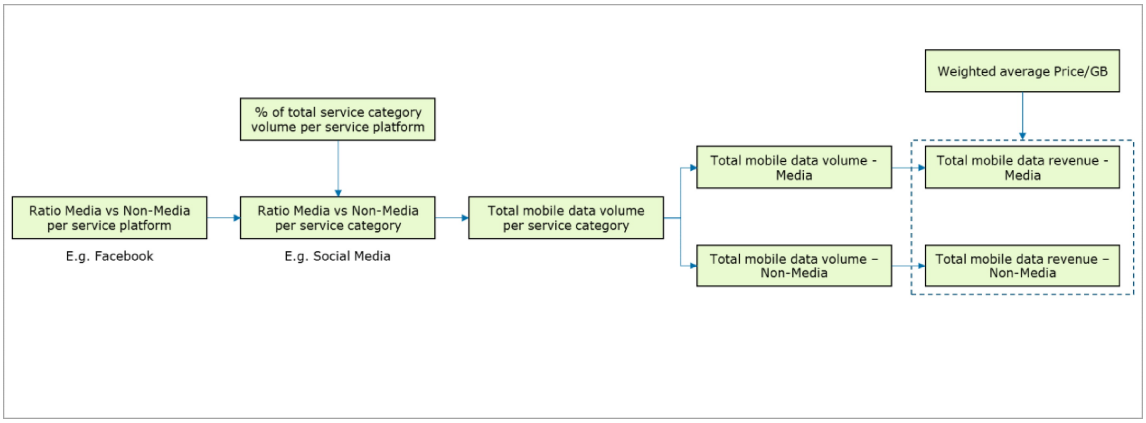

Figure 45: Computation of media in volume - Flowchart

For each service category, all the service platforms – available in the Mobile DNA as well as the Operator Data – had to be analysed to determine a percentage of media for each service platform.

7.1.1.1 Assessment on media content within service platforms

To clarify whether or not content is considered as media depending on approach 1 or 2, the methodology as described in chapter 4: identification of Media, has been applied. Hereunder, a non-exhaustive list of cases that needed to be categorised based on the methodology is inserted. Content that is made publicly by a registered media content provider is automatically regarded as Media.

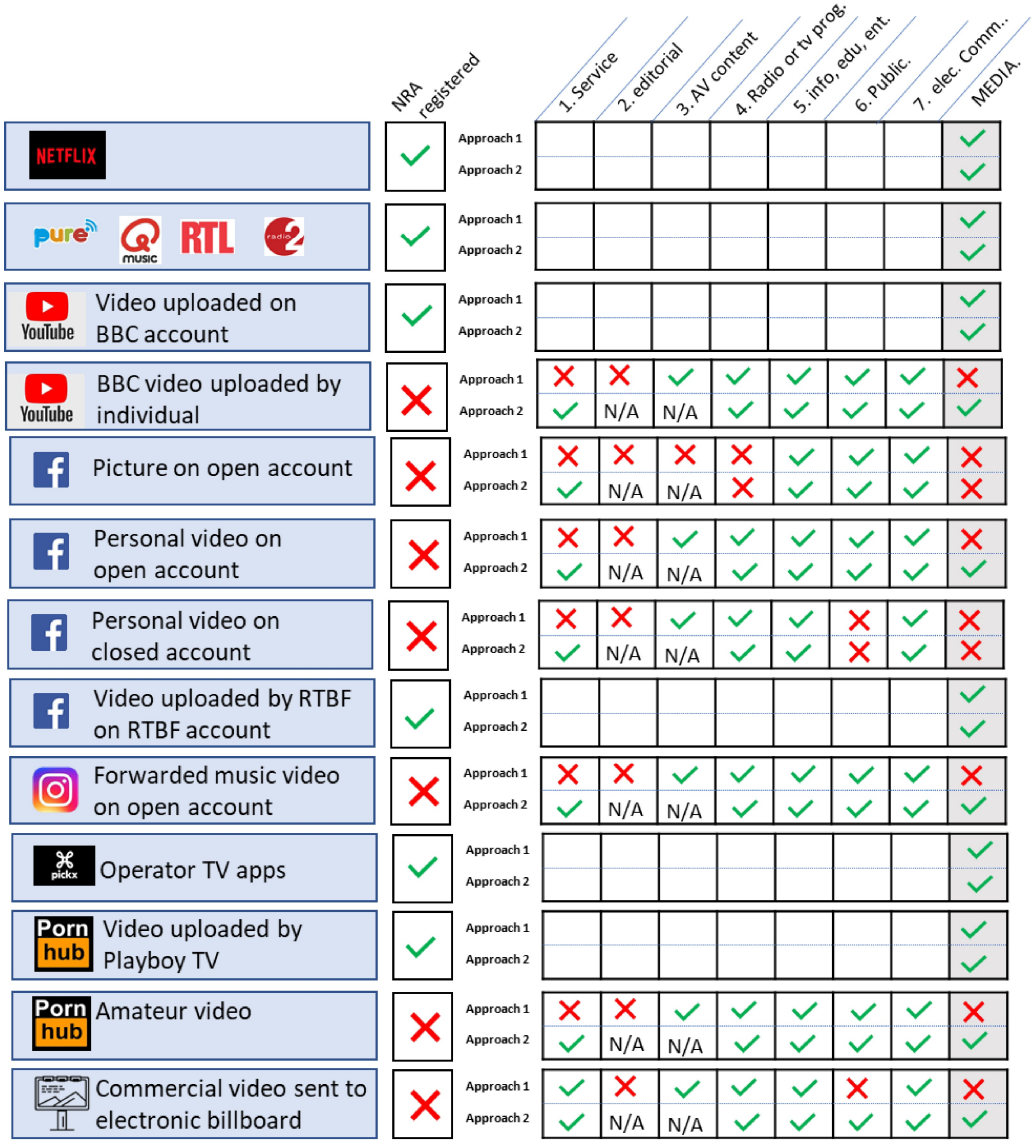

Figure 46: Assessment on media content within service platforms

To identify and quantify the majority of content in mobile data with respect for the methodology of both approaches, the following process has been applied.

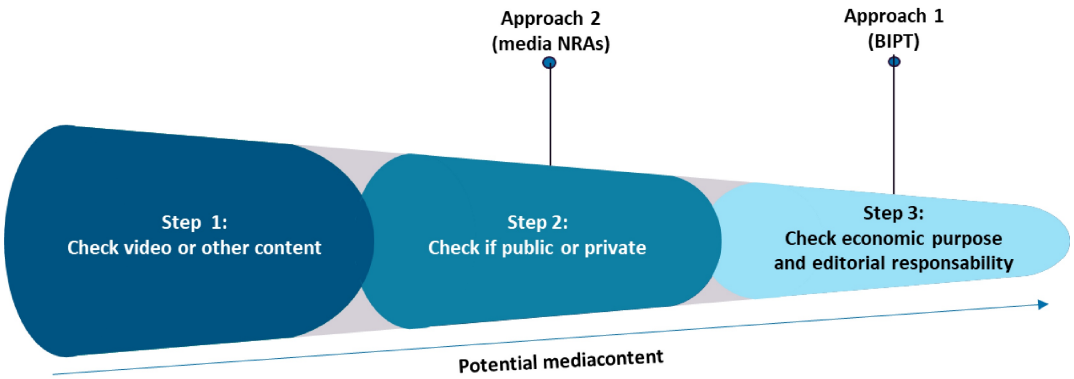

Figure 47: Process to assess the media content

In step 1, an analysis has been carried out on the quantity of mobile data originating from a specific platform that can be categorized as video. Hereby, non-video was considered as not being media. It is understandable that some other content, such as audio, could also be regarded upon as media, but it has technically not been feasible to differentiate further within the non-video category. The part audio via platforms such as Facebook, Instagram, Tiktok, YouTube is thus not calculated as Media. This is however a neglectable percentage as most of Audio on these platforms is combined with video, and because the throughput of audio, in comparison with video, is very low. In addition, most of the content within the service category Audio Streaming (Radio, Spotify, podcasts), where the majority of the pure audio content can be identified, is considered to be Media.

To determine the video/non-video ratio, data retrieved from operators and equipment providers[111] has been used for the most important platforms (Facebook, Instagram, YouTube, Twitter…). These data have been double checked through a theoretical calculation, based on presence of pictures or movies and on the average data usage on the specific platform.

In step 2 the video content is analysed to determine whether or not it is publicly shared. For most of the platforms, research has resulted in a percentage identifying the public/private purpose ratio of the content. The private content is excluded from potential media content. It has been assumed that the share of available (offered) content (being public or private) is equal to the share of consulted private or public content. Multiple studies acknowledge that trusted content (representing content coming from people or sources that are known) and personal content, show higher engagement rates (based on clicks, shares, likes and comments)[112]. This implies content categorised as private is likely to be more retrieved than public content. This overestimation of public content is partially balanced by the public content that is pushed on private accounts (for instance publicity published on a private account).

All data that is accessible via a private account is considered to be non-media, even if this content is originating from a registered media provider as the users can make changes or comment on the original content. When the content is not fully downloaded but is a link towards a public account, the session to consult the public media content is on an open account and is thus considered as Media as the content is consulted at the original public account.

[111] Huawei, Ericsson, Cisco

[112] Blog.hotsuite.com/private-accounts-on-instagram ; hartenzielmarketing.nl/kennisbank; …

Using step 1 and 2 provides a view that is aligned with approach 2. To come to an alignment with approach 1, the economic purpose and editorial responsibility has been verified in step 3. This additional check is based on sample analysis and/or on data that has been provided by these platforms or other research in this field.

This process is applied on the main platforms and content categories that represent more than 50% of all current mobile data traffic and used as basis to categorise all content to Media or Non-Media.

YouTube

Traffic data of the MNOs show that the content of YouTube consists out of 96% to 99% of video content. The remaining traffic being browsing or music. For this study, 100% of the YouTube content has been regarded as being video. Although some content is hidden, YouTube is primarily used to share non-private content. Therefore, all videos on YouTube have been considered as open for the general public. Applying approach 2, 100% of the YouTube-content can be regarded upon as being media.

To determine media using approach 1, a sample analysis has been conducted. By web scraping over a period from 27/11/2019 until 18/12/2019, the daily top 200 trending videos in Belgium on the YouTube platform have been identified together with the duration of each video and the number of views. This database, compiling data on 3800 videos, has been analysed using the methodology to determine media under approach 1. In this sample, content put online by media service providers registered at or licensed by the Belgian Media regulators or present in the MAVISE database have been identified. In addition, an analysis based on the AVMS criteria on non-registered content, and thus not covered by the MAVISE database, has been carried out. That way, apart from national and European recognized content, videos being published by non-EU media service providers are also considered to be media. (for instance, 'the Daily Show with Trevor Noah').

Taking into account the duration of the video, the number of interactions and the duration that the content was available, a daily weighted average has been calculated. Over the full period, an average of 10,4% media in the total sample has been identified[113]. Depending on the day we measured variations in Media content for approach 1 between 5,5% and 16,5%.

Considering 10,4% as Media (approach 1) in YouTube is certainly an overestimation. Besides the top trending content that has been analysed numerous videos are consulted representing in total a much higher data volume. Within the timeframe of this study it was not possible to analyse all this content, so the 10,4% to be Media is the only percentage that objectively could be calculated and is thus used for this study.

[113] Appendix 4: YouTube Webscraping

Figure 48: YouTube media/non-media repartition

Depending on the platform, an increase of the video share up to more than 90% is assumed over time. As You tube is already 100% video, the same repartition for media is used in the forecast model. We also have no indication that private accounts, and thus private content, will rise on You Tube. Therefore, the Media ratio of YouTube remains unchanged over the complete period of the forecasting model.

Facebook

Based on operator data, it could be established that the data traffic generated by Facebook consists for 70% out of browsing (text, pictures, ...) and 30% out of video. However, we came to a theoretical split browsing/video of 40%/60%. The difference between the operator data and the theoretical value can be explained by the fact that the theoretical usage is calculated on the total Facebook usage, via Mobile and Fixed (Wi-Fi) network together. People are aware of their data consumption[114] and postpone watching videos once they can offload the data traffic to a fixed network. Input from equipment providers[115] confirms that currently video content, in comparison to other content, is offloaded much more via WiFi (up to 90%). Therefore, we validated the 30% of video on Facebook via mobile data and used this for the baseline model.

Since August 2018, 54% of all Facebook users worldwide have set their privacy rules[116]. Although probably many users also applied privacy rules before that period, 54% of all accounts on Facebook have been assumed to be closed accounts, which probably is an underestimation as an earlier study in 2012 from the Polytechnic Institute of New York University[117] already put the percentage of private accounts at 55%. Nevertheless, 54% of Facebook traffic is kept as figure for private traffic. This

[114] Appendix 3: user survey
[115] Huawei traffic report 01/2020
[116] https://blog.sharelov.com/ultimate-list-of-facebook-statistics/
[117] https://www.prnewswire.com/news/polytechnic-institute-of-new-york-university; Facebook Users Take a Sharp Turn Toward Privacy

underestimation is again partly offset by the commercial public content that is pushed on Private accounts, but that is, as explained earlier much less consulted then private and trusted content.

The combination of the presence of video on Facebook and the percentage of public accounts provides a figure of 13,8% of content of video for a general public. This figure is the maximum figure applicable for approach 2. The sample analysis on YouTube showed that 10,4% of all content can be considered as media under approach 1. We see no reason why the presence of videos being media as understood for approach 1 would differ between Facebook and YouTube. Therefore, 10,4% has been assumed to be relevant. Applying this on the total public video volume (approach 2) means that 1,38% of the total Facebook mobile data volume can be considered as Media in approach 1.

The future media share in Facebook is influenced by an increase of video to 99%[118] in 2030 that is offset by an increasing need for privacy[119]and awareness on how private data are used[120]. Facebook CEO, Mark Zuckerberg, announced the intention to reposition Facebook towards a privacy-focussed communication platform. This repositioning is aligned with the current marketing practices that redirect content from companies towards private accounts and more personalised content in closed user groups. In addition, Facebook also announced to aim much more at trusted content from the traditional media channels to increase credibility and trust in the Facebook content[121]. Based on these evolutions, the ratio of private accounts and of media under approach 1 has been presumed to rise resulting in a media presence increase in 2030 up to 25% for approach 2 and 5 % for approach 1. As evolutions after 2030 are highly speculative, the media share is kept stable as of 2030.

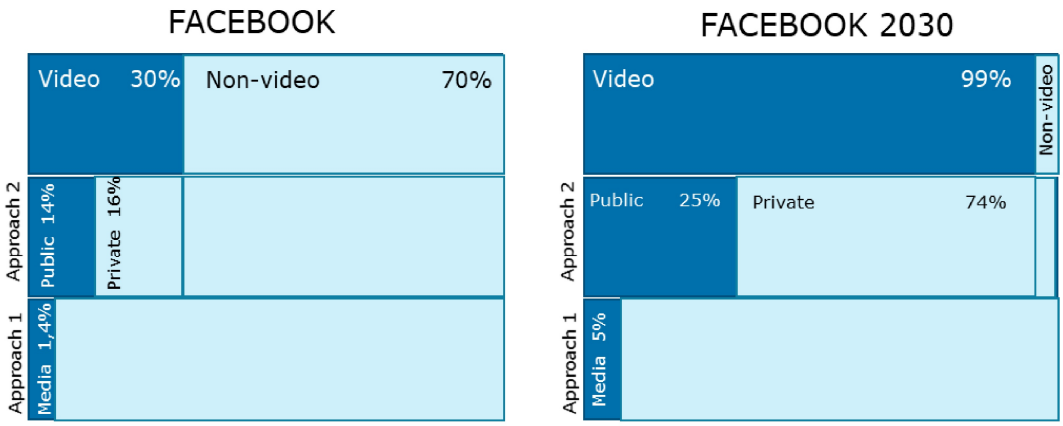

Figure 49: Facebook media/non-media repartition

[118] https://www.businessnewsdaily.com/10522-future-of-social-media-marketing.html
[119] De Standaard 10/01/2020 – 'de toekomstbol van Zuckerberg'
[120] https://blog.logograb.com/social-media-future/
[121] https://newsmediaworks.com.au/facebook-turns-to-trusted-media-to-send-a-message-of-reliability/

Instagram

Based on data from the mobile operators, 87% of all data from and to the Instagram platform has been determined to be generated by video-content. Although Instagram is currently still mainly a platform build on content from pictures, 91% of all consulted content are pictures[122], the majority of the generated volumes are originating from videos. Based on the average data usage of pictures and videos on Instagram[123], a theoretical video content percentage in the total content is calculated at 95%.

The difference (8%) between the theoretical value and the data from the operators can again be explained by the consumer behaviour that demonstrates that videos are more watched when offloaded via the fixed network. Hence, the percentage of 87% will be used in this study for the baseline.

To determine the ratio of public and private content on Instagram, we used a study from 2015 that identified 43% of the user accounts as private[124].

Measuring exactly the media presence on Instagram based on approach 1 is challenging, as overall lists of trending accounts or top accounts per country are not available. To put the usage of content and the related media percentage on Instagram in perspective, the top 10 most consulted registered Belgian media service providers[125] were identified based on the top 10 most followed influencers on Instagram based in Belgium[126] and the top 10 most followed Instagram accounts[127]. For all these, the number of interactions for the month of November 2019 (an interaction being a comment or like) have been determined. Comparing the number of interactions between the top Belgian media service providers and the top influencers, shows that media represents a minor part of all content available, as it accounts to only 11% of the combined data volume of these 2 segments. The worldwide top accounts are also not media-like content as defined under approach 1 and reflects the low involvement from media service providers on Instagram. The media percentage of 11% is thus a large overestimation of the actual presence in the total Instagram traffic, as besides the analysed segments much more content is available and looked at. However, this figure matches the 10,4% that was measured on YouTube as being media with approach 1 and it is, within the scope of this study, the best available quantification of media presence as defined in approach 1. Therefore, the 11% is used as Media presence for approach 1.

Based on the above, for the baseline the media presence is set at 5% for approach 1 and at 50% for approach 2. For 2030, an increase of the video share is assumed from 87% up to 99%. This increase over time of the video percentage is for Instagram not compensating the rise of private accounts, as also companies tend to evolve to closed user groups on Instagram. As for Facebook, we assume that also this platform will aim to attract more official media content. As a result of these trends, the Media presence on Instagram decreases to 43% in approach 2 and remains stable for approach 1 in 2030.

[122] Locowise.com/blog/instagram-hits-most-low-growth- and engagement-down
[123] http://support.schedgr.am/support/solutions/articles/1000201572-instagram-video-specifications
[124] https://www.slideshare.net/melkischoller/10-surprising-instagram-facts
[125] https://rankings.storyclash.com/instagram-ranking-belgium-2019/
[126] https://www.statista.com/statistics/818251/most-followers-instagram-belgium/
[127] https://en.wikipedia.org/wiki/List_of_most-followed_Instagram_accounts

Again after 2030, the media presence for both approaches is assumed to be stable as after that period we have no certainty on possible evolutions.

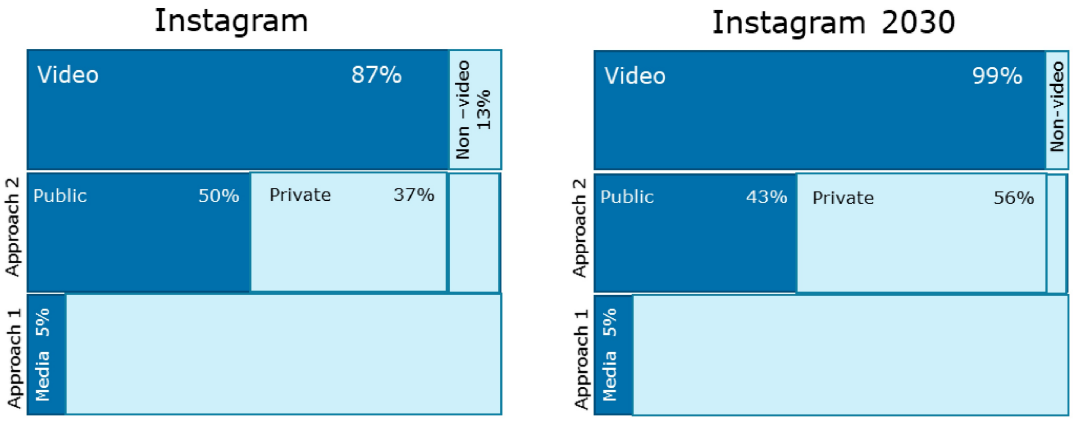

Figure 50: Instagram media/non-media repartition

Twitter

Based on data from the mobile operators, we identified that 69% of the data consumption on Twitter has been identified as video content. On average 13% of Twitter users reserve their content for a private user group[128].

We have not analysed the presence of registered media on Twitter. However, multiple sources recognize the fact that Twitter content is driven by content of large, official channels that are afterwards retweeted by other users. Retweeting as such is non-media under approach 1 as this does not incorporate an editorial responsibility. Nevertheless, as a precaution to avoid underestimating the media presence on Twitter, it has been assumed that it lies higher than on the other platforms (on average around 10% of the total mobile traffic), hence, it is presumed that 50% of the total mobile video volume can be categorized as media under approach 1. When applying approach 2, a retweet of a media message is considered as Media.

For forecasting purposes, the same evolutions on privacy and video have been used as on other platforms.

[128] https://medium.com/pew-research-center-decoded/how-public-and-private-twitter-users-in-the-u-s-d536ce2a41b3

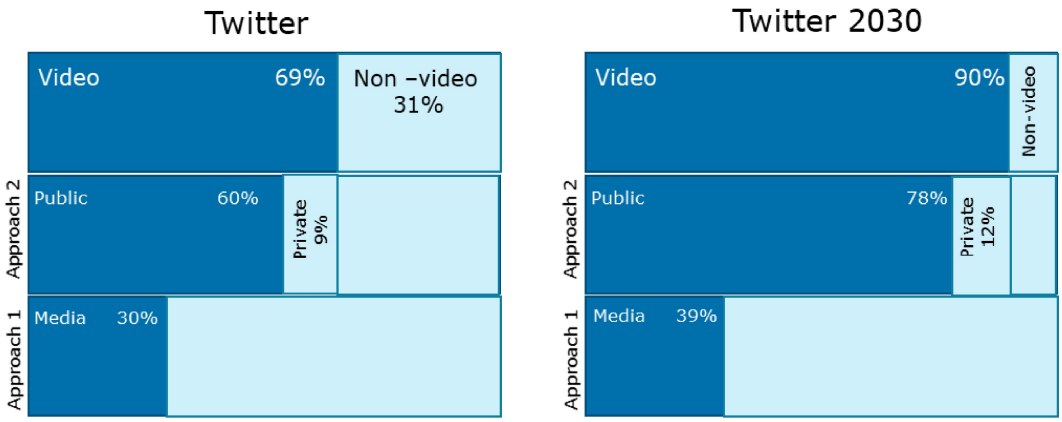

Figure 51: Twitter media/non-media repartition

Pinterest

In comparison to other platforms, Pinterest started late with enabling video content on the platform which explains the lower video penetration[129]. According to operator data, non-video (mainly pictures) represents 60% of the mobile data usage.

Although secret boards and private accounts are possible on Pinterest, no relevant data could be identified. It has been presumed that most of the traffic on Pinterest is publicly shared (95%).

Pinterest is mostly used to share personal content and product information. Media content, as relevant under approach 1, is not the main purpose of Pinterest. In this study, Pinterest has been considered as having the same media presence as YouTube (10,4%), which is probably an overestimation.

Also for Pinterest we expect that video will become the majority of mobile data in 2030.

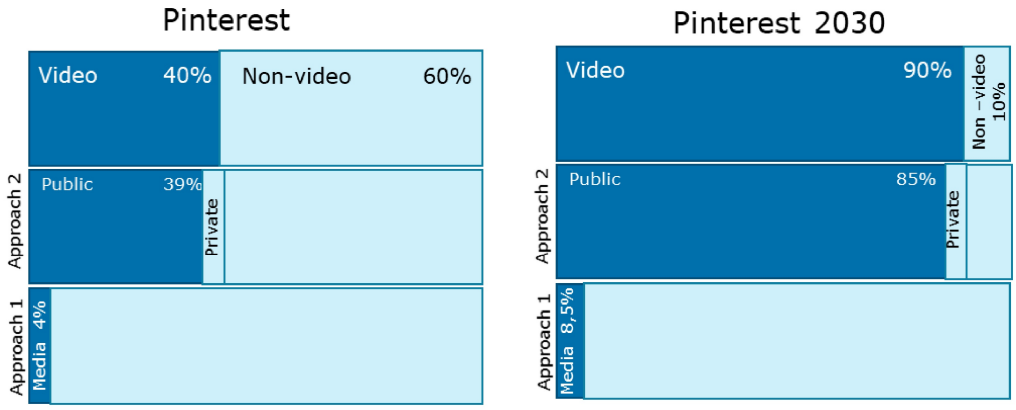

Figure 52: Pinterest media/non-media definition

[129] https://www.businessofapps.com/data/pinterest-statistics/

Other platforms

With the above platforms, the vast majority of the mobile data traffic on the service platforms has been covered. However, platforms representing a minor mobile data volume could also be identified. These platforms are also taken into account by attributing them a similar profile as YouTube, Facebook, Instagram or Pinterest. Examples of such platforms are Snapchat, Naver V, Odnoklasniki video, Reddit,… .

Other content

Analysing all mobile data content, or even a relevant sample, was within the limited timeframe of this study not possible. The main mobile destinations identified were analysed. Other destinations are grouped under 'browsing'. In this group, the data usage to consult search engines, e-commerce, web analytics and the overall internet surfing to individual websites has been included. As basis to determine the media presence in these internet destinations, we applied the overall figures of 65% video and 35% non-video[130] taking again into consideration the current usage behaviour of delaying to watch video until offload to the fixed network is possible and specific groups of destinations that have more or less video (For instance e-commerce and Google are at this moment more oriented to text and pictures). Within the model, the barrier to watch video only when offloading is gradually lifted between 2020 and 2025 as in that period unlimited data offers will become popular.

The figure of 65% video is in line with equipment providers information that set video presence on the internet in general at 60%. As for media under approach 1, the same value as on YouTube for media (10,4%) has been applied in the relevant destinations under this category. This is again an overestimation of the media presence as in these destinations the main purpose is mostly not to provide an audio or audiovisual programme. For forecasting purposes, the video share is assumed to increase up to more than 90%.

7.1.1.2 Media within Service Categories

By combining the data received from the operators and from IMEC, the percentage of volume for each service platform within its respective service category has been identified. This was used to determine the weight of media per service platform. As a result, the model delivers a weighted average percentage of media within mobile data volume per service category.

Within the following service categories the media percentage, now and in the future is set at zero because the usage in these categories is or private communication, or comprises no video or audio content or has no main purpose to offer an audiovisual programme or is a combination of those:

- Messaging
- Gaming
- Maps & Navigation
- Email
- Cloud Storage
- App Store & Updates

[130] https://wp-rocket.me/blog/best-practice-guide-reducing-website-page-weight/

- Offline

The categories hereunder have been attributed a percentage of media presence as they consist of content aligned with the Media approach methodology. For these categories, an evolution until 2030 is forecasted based upon above mentioned trends on video penetration, less video offload, increase of privacy and closed user groups and demand for more trusted and well-known content:

- Social Media
- Browsing
- Video Streaming
- Audio Streaming

Within these categories the media presence gradually increases due to the growth of video content in mobile data. As of 2030, the media percentage has been assumed to remain stable as further potential evolutions to have more or less media is highly speculative.

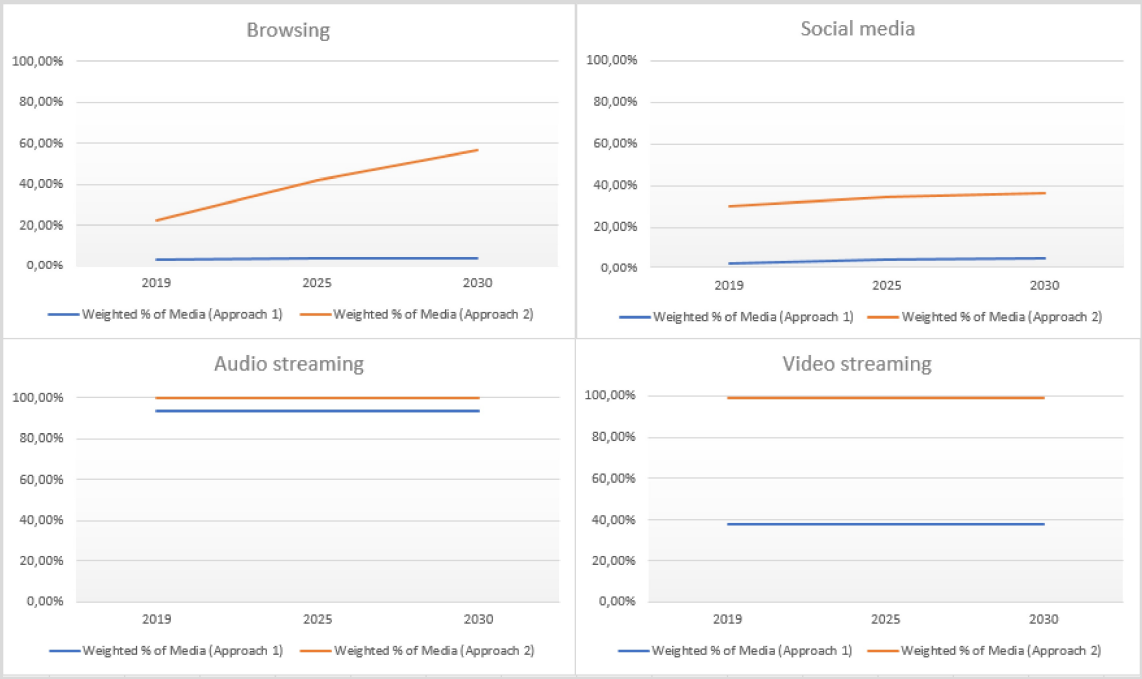

Figure 53: Evolution of media within service categories

By combining the forecasted Media percentages with the total mobile data volume per service category over time, the model forecasts Media in Total Standard Mobile Data Volume. Considering Mobile Substitution is not included in this usage, VoLTE and Fixed Wireless Access were handled separately.

Regarding VoLTE usage, the percentage of Media is 0%. For Fixed Wireless Access, however, we assumed that the percentage of Media is the same as for total standard mobile data. This assumption is based on the fact that FWA in the model is only showing significant volumes as of 2025, when it is expected that mobile data becomes a commodity and users no longer adjust their usage behaviour depending on the network they are using.

Based on the above, the output of the model provides the following forecasting for percentage of Media in Individuals' Mobile Data Volume:

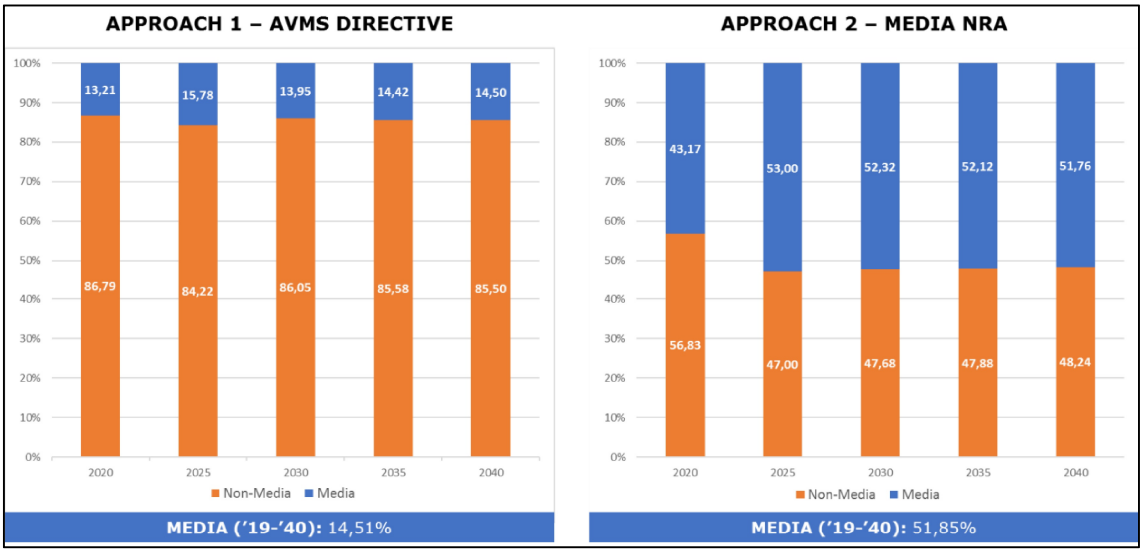

Figure 54: Proportion media/non-media per approach for individuals vs objects

The weighted average percentage of Media in Individuals' Mobile Data Volume over time in Approach 1 (i.e. AVMS Directive) results in 14,51%, whereas Approach 2 (i.e. Media NRAs) results in 51,85%. In both approaches the percentage of Media increases, which can be explained by the fact that more video will be consumed in the service categories Video Streaming, Browsing as well as Social Media.

7.1.2 Objects

Within Objects only one use case has been identified as potentially being Media, which is electronic billboards. In General, the use cases have no purpose to be an audiovisual programme nor have a public nature. Although several use cases are based on video, the content of these videos are, in first instance, not conveyed through screens accessible for the general public. The videos can, in a second leg of the data stream, be addressed to an audience. This part of the data stream is covered in the Individual part, and is, if applicable, also tagged as Media..

An exception to the above are electronic billboards. The content distributed via the billboards could be tagged as Media for approach 2 and is incorporated in this study as such. In comparison with other use cases the data volume and related revenue is very low and has on the total result a neglectable impact of 0,0018% on the percentage of Media in Mobile Data Volume.

7.1.3 Total

When aggregating the Mobile Data Volume of both Individuals and Objects, the actual forecasted percentage of Media over time was established:

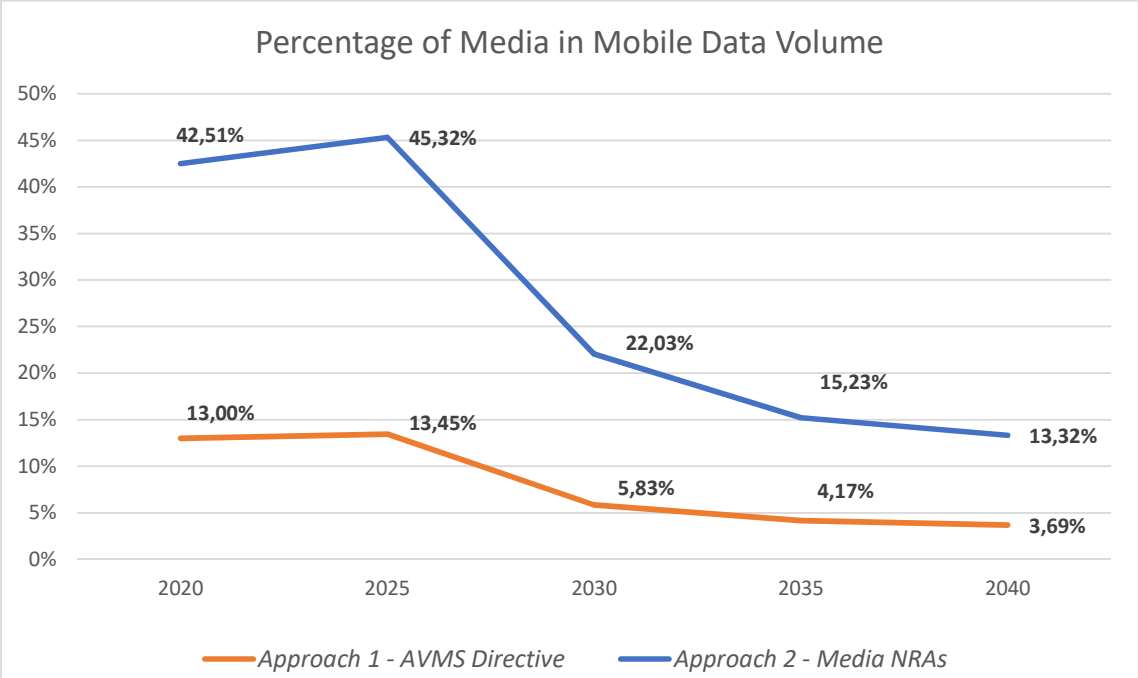

Figure 55: Percentage of media in mobile data volume

Between 2020 and 2025 the percentage of Media consumption grows slightly, driven by more video presence in mobile data content. After 2025, this is quickly offset by the increase in Objects' Mobile Data Volume.

In Chapter 8: Conclusions, we will further elaborate on the weighted average of Media in Total Mobile data.

7.2 Media in Revenue

7.2.1 Individuals Revenue

As depicted above, the model is built on media presence in total mobile data volume and links it to its respective price per GB, to determine Media in Total Mobile Data Revenue. In other words, by linking the percentage of Media in Standard, VoLTE and Fixed Wireless Access mobile data volume to its price per GB the model determines the percentage of Media in Total Mobile Data Revenue. However, as we must consider all mobile revenue generated from traffic on the spectrum, the model also assesses Mobile Voice & SMS Revenue – which is considered as Non-Media.

Based on the above, the output of the model provides the following forecasts for percentage of Media in Individuals' Mobile Revenue:

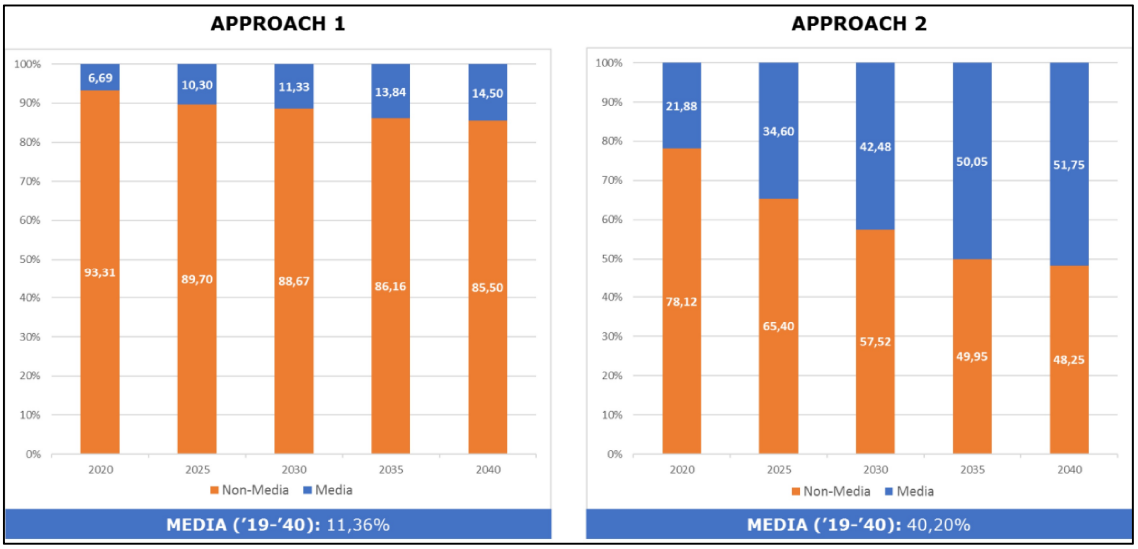

Figure 56: Proportion of media/non-media per approach for individuals

The weighted average percentage of Media in Individuals' Mobile Revenue in Approach 1 (i.e. AVMS Directive) results in 11,36%, whereas Approach 2 (i.e. Media NRAs) results in 40,20%. The increase of percentage of Media in both approaches can be explained by the gradual reduction of Revenue generated from Mobile Voice & SMS. As Mobile Voice & SMS Revenue is phased out, the percentage of Media in Individuals' Mobile Revenue moves closer to the percentage of Media Individual's Mobile Data Volume.

7.2.2 Objects Revenue

As the only use case identified as Media in Objects is electronic billboards, the Revenues linked to Media is neglectable. Only 0,0011% of Object Mobile Data Revenues is tagged as Media under approach 2.

7.2.3 Total Revenue

By aggregating the Mobile Revenue of both Individuals and Objects, the actual forecasted percentage of Media over time is established.

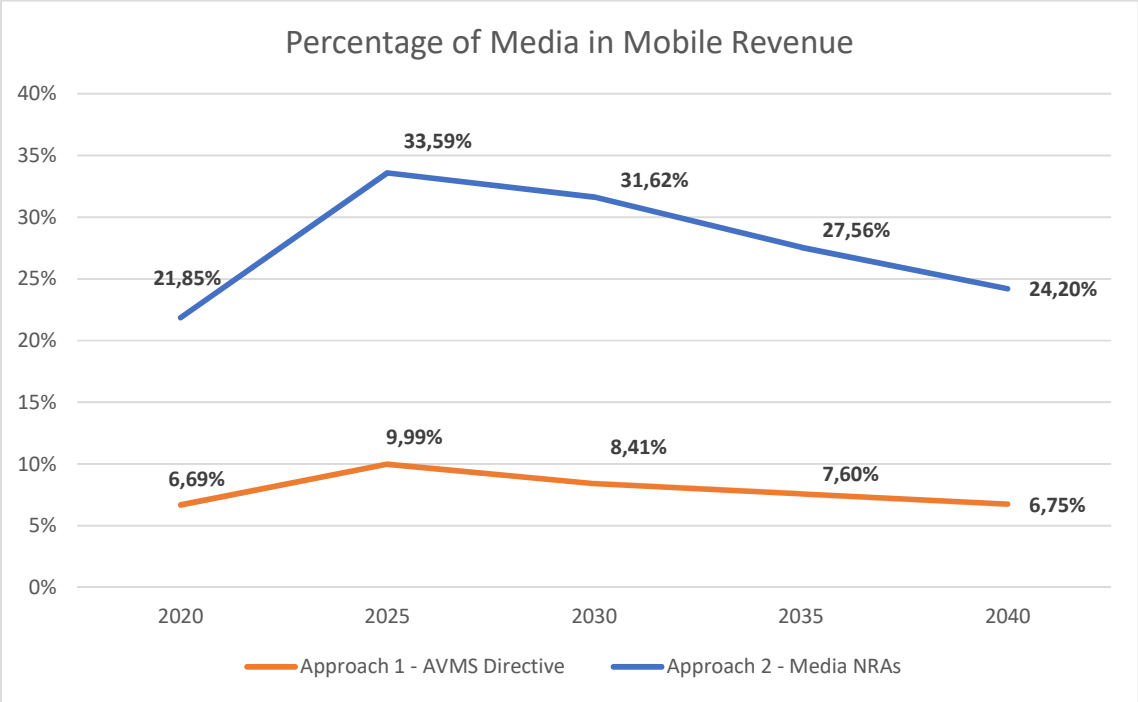

Figure 57: Percentage of media in mobile revenue

The percentage of Mobile Revenue attributable to Media consumption grows in the first few years. However, the revenue generated from Objects offsets the increase over time. Do note that the Objects impact in terms of Mobile Revenue is lower compared to Mobile Data Volume due to the lower average price per GB and related revenue generated.

8. CONCLUSION

The model has provided a clear view on Mobile data evolution for as well Individuals as Objects. To ensure a realistic forecast, a conservative approach on assumptions has been applied by only accepting use cases that are existing or will appear shortly on the market or that are subject to extensive studies and reporting.

Based on the evolution of volumes and revenues over 20 years we have calculated the weighted average over this period. The impact of Individuals remains relatively stable over time, whereas the impact of Objects increases heavily due to the new industrial applications on the mobile spectrum.

The mobile traffic evolution and related revenues provide a strong indication on the challenges and opportunities for all players in the eco-system of mobile telecommunications. In the Individual part of the model, voice revenues still represent on average 50% of the mobile revenues of operators. This source of revenues will fade out in the future due to technologic evolutions, shifts in user behaviour and competing services using other business models. In order to ensure a constant revenue stream the mobile operators will have to focus on valorisation of the access to the mobile network and of the services offered on the network. Currently all operators are experiencing difficulties to position them successfully versus the OTT-players who are claiming an important part of the consumer budget for telco services. The usage of the mobile data for these services will certainly show a spectacular increase the next years, and media presence in it will increase accordingly.

Interesting opportunities for growth are present in the Object part of the model. With 5G and the additional features this technology brings, new business applications and use cases will appear on the market. By bridging the gap between telco and IT, 5G is opening a new world of possibilities and opportunities. This new approach from mobile telco business on the business market is however also an enormous challenge for the current operators as they must re-invent their customer approach and incorporate IT in their value proposition. Simultaneously, this is opening the market for new players who earlier were not active on the telecom market or only present in a specific niche market. In all these specific elements of the model being it Media, Individual or Object, the Belgian governments should take up their responsibilities to create the best environment to foster the opportunities that arise. The new eco-system around mobile data extents further than the current telecom players. The majority of the value will be created in the development of new applications, services and implementation in an end-to end approach. As such, the forecasted revenues are only a small part of the added value that will be created. A macro-economic challenge is presenting itself by the need to ensure that our economic network can act upon these opportunities and that new activities are developed in Belgium. A well-developed mobile network infrastructure and service is, and will be in the future even more, a strategic asset for economic development and should be a pillar of a long term economic strategic vision.

Within these evolutions of mobile data volumes and revenues, the presence of media (independent from how this is calculated) evolves also. Until now, the spectrum was only (or for the large majority) used for communication and exchange of information. This usage of the spectrum for these applications, and Media in these, will increase strongly in numbers. However, this increase of media presence will be compensated and, later in time, be pulled down by the Object part, consisting out of industrial applications, that represents a different data content then the images, text and videos we now primarily use in mobile data.

Based on the model the weighted average percentage of Media in Total Mobile Data Volume over time (2019 to 2040) was determined to be **4,94% in Approach 1 (AVMS Directive)** and **17,79% in Approach 2 (Media NRAs)**.

Based on the model the weighted average percentage of Mobile Revenue attributable to Media over time (2019 to 2040) was determined to be **7,94% in Approach 1 (AVMS Directive)** and **28,20% in Approach 2 (Media NRAs)**.

	Media presence in Mobile data 2019-2040	
	Based on: Volumes	Based on: Revenues
Approach 1 AVMS-Dir.	4,94%	7,94%
Approach 2 Media NRAs	17,79%	28,20%

Table 5: Summery of the proportion of media presence in mobile data volumes and revenues

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APPENDIX 1: USER SURVEY

1. Survey aim and methodology

PURPOSE OF THE SURVEY

The purpose of the study was to measure how and when users consume mobile data on their mobile phones. Additionally, the outcome provided insights on the time spent on mobile data versus Wi-Fi as well as the drivers and barriers behind the users' choice. The collected data helped to interpret the data found throughout the desk research as well as the data received from the operators and IMEC. Furthermore, the questionnaire permitted to quantify data that could not be found in other sources.

To carry out this study, Capgemini called upon the research agency Profacts. Together, a quantitative survey questionnaire was created and pushed online among Profacts' research panel. The sample had to reach 1200 respondents, representative of the Belgian population aged between 16-80 while keeping equally sized segments for Flanders, Wallonia and Brussels.

Throughout the questionnaire, six topics have been covered:

1. **Socio demographic/screenings:** age, region, profession smartphone possession, …
2. **Data consumption:** time spent online, consumption of videos/audio, …
3. **Offload (Mobile Data versus Wi-Fi)**: choice between Wi-Fi and Mobile Data based on location, speed, price and quality perception among Wi-Fi and mobile data, …
4. **Future**: intention to "cut the cord", choose for unlimited subscription, buy a 5G enabled device, …
5. **Details mobile suscription** : subscription type, data usage, provider, …
6. **Accessed content**: consumed TV/radio channels, classification of media/non-media channels, …

The user survey questionnaire can be consulted in the next section (2. Survey questionnaire).

METHODOLOGY

In total the survey had 1346 respondents (gross sample) representative of the Belgian population (aged between 16-80). After the filter question "Do you own a smartphone", the net sample equals to n=1210. This results in a reliability of 95% with an error margin lower than 3% on the total sample.

In the scope of this study, the distinction was made between respondents from Brussels, Flanders and Wallonia. The target per region was n=400 in order to keep the error margin under 5% for each region. Consequently, the outcomes have been weighted to ensure the representativity of the population (e.g. not underestimating Flanders while overestimating Brussels). The computed weights per region were the following: Flanders: 57.81%, Brussels: 10.38%, Wallonia: 31.81%.

Within each region, the gender, age and province have been weighed too. The weights were computed on the gross sample (all respondents incl. the ones who do not own a smartphone) and determined based on the latest figures from Statbel. [1]

[1] https://bestat.statbel.fgov.be/bestat/crosstable.xhtml?view=f2bf9fa3-6609-4955-9627-76180ae20d66

2. Survey questionnaire

Content

Client	BIPT
Project	Mobiel datagebruik
Questionnaire length	12 min
Multi waves / multi country	No
Required languages	NL + FR
Data Collection method	CAWI
Sample source	Profacts panel + external panel
Target Group	Rep sample of Belgian mobile population
Sample size	n = 1200
Quota	Quota on brut sample on Leeftijd, Geslacht, Provincie
Material / pictures	No
Subject in e-mail	Hoeveel bedraagt uw schermtijd?

PART 1. Intro + screening

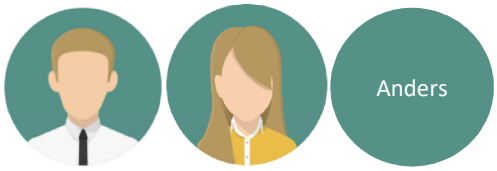
<IT: create dummy DayOfInterview based on Startdate >

DayOfinterview	Startdate
1. Monday	18/11/2019 or 25/11/2019 or 2/12/2019 or 9/12/2019
2. Tuesday	19/11/2019 or 26/11/2019 or 3/12/2019 or 10/12/2019
3. Wednesday	20/11/2019 or 27/11/2019 or 4/12/2019 or 11/12/2019
4. Thursday	21/11/2019 or 28/11/2019 or 5/12/2019 or 12/12/2019
5. Friday	22/11/2019 or 29/11/2019 or 6/12/2019 or 13/12/2019
6. Saturday	23/11/2019 or 30/11/2019 or 7/12/2019 or 14/12/2019
7. Sunday	24/11/2019 or 15/11/2019 or 8/12/2019 or 15/12/2019

R0. Kies uw taal / Choisissez votre langue

1. Nederlands
2. Français

R1. Bent u een…?



1. Man 2. Vrouw 3. Anders

R2. Wat is uw geboortejaar?

|___|___|___|___|

1. 16-24
2. 25-34
3. 35-44
4. 45-54
5. 55-64
6. 65-80

R3. Wat is de postcode van uw hoofdverblijfplaats?

|___|___|___|___|

1. Antwerpen
2. Brussels Hoofdstedelijk gewest
3. Henegouwen
4. Limburg
5. Luik
6. Luxemburg
7. Namen
8. Oost-Vlaanderen
9. Vlaams-Brabant
10. Waals-Brabant
11. West-Vlaanderen

---

1. Heeft u een smartphone? *Een smartphone is een gsm die de mogelijkheid heeft om op het internet te gaan, apps te downloaden... De meerderheid van de smartphones hebben een touchscreen.*

    1. Ja, één
    2. Ja, meerdere
    3. Nee

PART 2. Datagebruik en -verbruik

2. Bent u gisteren op de volgende momenten van de dag online gegaan met uw smartphone? *Als u tijdens een bepaald moment zowel mobiele data als wifi gebruikt heeft, gelieve dan de optie te selecteren waarmee u het langst online bent geweest.*

>

a. Tijdens het ontbijt
b. Tijdens het woon-werkverkeer
c. Tijdens de werkuren
d. Tijdens verplaatsingen met de auto, openbaar vervoer, …
e. In de voormiddag
f. Tijdens de lunch
g. In de namiddag
h. Tijdens het avondmaal
i. ’s Avonds na het avondmaal
j. ‘s Nachts

1. Ja, via mobiele data (4G)
2. Ja, via wifi
3. Nee, ik ben niet online gegaan

---

3. U gaf aan gisteren tijdens de volgende momenten online te zijn geweest met uw smartphone. Hoelang bent u telkens online geweest?

a. Tijdens het ontbijt
b. Tijdens het woon-werkverkeer
c. Tijdens de werkuren
d. Tijdens verplaatsingen met de auto, openbaar vervoer,
e. In de voormiddag
f. Tijdens de lunch
g. In de namiddag
h. Tijdens het avondmaal
i. 's Avonds na het avondmaal
j. 's Nachts

4. Heeft u gisteren audio beluisterd of video's bekeken via mobiele data (4G)?

1. Ja, audio beluisterd
2. Ja, video's bekeken
3. Ja, beide
4. Nee, geen van beide

5. Hoelang heeft u gisteren in totaal audio beluisterd en video's bekeken via mobiele data (4G)?

< minuten audio

< minuten video

6. Via welke app(s)/website heeft u gisteren audio beluisterd en/of video's bekeken via mobiele data (4G)?

1. Via app/site van telecomproviders (Telenet, Proximus, VOO, Orange, ...)
2. Via app/site van tv- of radiozenders (VTM, VRT, RTBT, RTL, Q-App, NRJ radio, Nostalgie radio)
3. Facebook
4. Instagram
5. Youtube/Vimeo/Dailymotion
6. Netflix of andere videodeelplatformen
7. Spotify/Deezer/Apple Music
8. Andere, namelijk

7. Van de minuten waarin u gisteren audio beluisterd heeft en/of video's bekeken, hoeveel procent was er media-inhoud en hoeveel non-media-inhoud? *Met media bedoelen we inhoud die direct afkomstig is van mediakanalen (radio- en televisiezenders). Inhoud verdeeld of opgemaakt door privépersonen valt onder non-media-inhoud.*

% media-inhoud

% non-media-inhoud

PART 3. 4G vs. Wifi

8. In welke mate gaat u akkoord met de volgende stellingen over Wifi en mobiele data via 4G?

   a. Wifi is gemiddeld genomen sneller dan mobiele data via 4G.
   b. Wifi is veiliger dan mobiele data via 4G.
   c. Wifi is goedkoper dan mobiele data via 4G.
   d. Het downloaden van zware bestanden verloopt het best via Wifi.
   e. Eens de limiet van mijn mobiel data volume overschreden is, wordt het heel duur.
   f. Ik maak doorgaans een bewuste keuze tussen Wifi en 4G.

<IT: columns, scaled>

1. Helemaal niet akkoord
2. Niet akkoord
3. Neutraal
4. Akkoord
5. Helemaal akkoord

---

9. Als u op de volgende locaties online wil gaan met uw smartphone en de keuze hebt tussen Wifi of 4G, wat doet u dan?

>

1. Thuis of op het werk
2. Op openbare plaatsen

<IT: columns>

1. Ik kies (bijna) altijd voor Wifi
2. Ik wissel af tussen Wifi en 4G, afhankelijk van wat ik wil doen

3. Ik kies (bijna) altijd voor 4G

PART 4. Toekomst

10. In welke mate overweegt u om op korte of middellange termijn uw abonnement voor digitale televisie op te zeggen en enkel nog televisie te bekijken via andere kanalen (bv. het internet)?

<IT: columns>

1. 1 - Zeker niet
2. 2
3. 3
4. 4
5. 5
6. 6
7. 7
8. 8
9. 9
10. 10 – Zeker wel/Ik doe dit al

---

11. In welke mate overweegt u om op korte of middellange termijn een ongelimiteerd mobiele data-abonnement te nemen?
    1. 1 - Zeker niet
    2. 2
    3. 3
    4. 4
    5. 5
    6. 6
    7. 7
    8. 8
    9. 9
    10. 10 – Zeker wel/Ik heb dit al

---

12. In welke mate zou u bereid zijn om een nieuwe smartphone te kopen bij de lancering van 5G in België, gesteld dat compatibele toestellen ongeveer 100 tot 200 euro duurder zullen zijn dan de huidige toestellen?
    1. 1 - Helemaal niet bereid
    2. 2
    3. 3
    4. 4
    5. 5
    6. 6
    7. 7
    8. 8
    9. 9
    10. 10 – Heel erg bereid

---

13. Bent u bereid om in de toekomst een groter deel van uw gezinsbudget te gebruiken voor telecommunicatie (gsm/internet/televisie/telefonie) indien die technologieën veel meer mogelijkheden zouden brengen?

1. Ja, tussen 1 en 25 euro per maand
2. Ja, tussen 26 en 50 euro per maand
3. Ja, tussen 51 en 75 euro per maand
4. Ja, tussen 76 en 100 euro per maand
5. Ja, meer dan 100 euro per maand
6. Nee

---

14. Zou u in de toekomst meer mobiele data kopen…

g. … als de kwaliteit ervan nog beter wordt (bv. betere netwerkdekking)?
h. … als de snelheid ervan nog toeneemt (bv. betere downloadtijd)?
i. … als de prijs ervan daalt?

1. Zeker niet
2. Waarschijnlijk niet
3. Neutraal
4. Waarschijnlijk wel
5. Zeker wel

---

15. Indien u een zelfrijdende auto zou hebben, hoe zou u uw rijtijd dan opvullen? *Meerdere antwoorden mogelijk.*

1. Slapen
2. Werken
3. Video's kijken
4. Boek/krant lezen
5. Gamen
6. Berichten sturen/antwoorden
7. Andere, namelijk

PART 5. Details mobiel abonnement

In dit voorlaatste deel volgen nog enkele vragen over uw huidige mobiele abonnement.

---

16. Heeft u een gsm-abonnement, een herlaadkaart of beide?

1. Gsm-abonnement
2. Herlaadkaart
3. Beide

---

17. Hoeveel verschillende ... heeft u zelf op dit moment?

18. Worden al deze simkaarten actief (minstens 1 keer per week) gebruikt door uzelf?

1. Ja, allemaal
2. Ja, sommige
3. Nee

---

19. Wie is uw gsm-operator? *Kies de operator van de herlaadkaart of het abonnement waarvan u het meest gebruik maakt.*

1. Proximus
2. Orange
3. Scarlet
4. Telenet
5. VOO
6. Base
7. Jim Mobile
8. Lycamobile
9. Mobile Vikings
10. Andere, namelijk:
11. Ik weet het niet

---

20. Wie betaalt uw gsm-uitgaven?

1. U en/of iemand anders van uw familie betaalt alles zelf als privé-persoon
2. U en/of iemand anders van uw familie betaalt alles zelf als zelfstandige
3. U (en/of iemand anders van uw familie) betaalt een gedeelte, de rest wordt betaald door uw werkgever of die van uw partner
4. Uw werkgever of die van uw partner betaalt alles

---

21. Hoeveel bedragen uw gsm-uitgaven ongeveer op maandelijkse basis*? Gelieve een schatting te geven als u het niet exact weet*.

< euro

---

22. Over hoeveel mobiele data beschikt u op maandelijkse basis?

1. Minder dan 1 GB
2. 1-2 GB
3. 3-5 GB
4. 6-10 GB
5. 11-15 GB
6. Meer dan 15 GB/Ongelimiteerd
7. Ik weet het niet

---

23. Hoeveel mobiele data verbruikt u op maandelijkse basis?

1. Minder dan 1 GB
2. 1-2 GB
3. 3-5 GB
4. 6-10 GB
5. 11-15 GB
6. Meer dan 15 GB
7. Ik weet het niet

---

24. Hoe vaak overschrijdt u uw maandelijks mobiel datavolume?

1. (Bijna) maandelijks
2. Enkele keren per jaar
3. Nooit

---

25. Heeft u een mobiel abonnement waarin u apps kunt kiezen die niet meegerekend worden in uw dataverbruik (bv. onbeperkt Facebook gebruiken)?

1. Ja, voor deze app(s):
2. Nee

PART 6. Socio-demo

In dit laatste deel volgen nog enkele algemene, afsluitende vragen.

---

26. Via welke kanalen bekijkt u tv-programma's/films/series? *Meerdere antwoorden mogelijk.*

1. Standaard TV-omroepen (VRT, RTBF, RTL, …)
2. Omroepen via internet (Stievie, NWS nu, Auvio, RTLplay, VTM GO …)
3. Videoplatformen (Netflix, Stremio, …)
4. Sociale media (Youtube, Facebook, Instagram …)
5. Andere, namelijk
6. Ik kijk niet/heel zelden naar tv-pogramma's/films/series

---

27. Via welke kanalen luistert u naar muziek, nieuws, podcasts …?

1. Radio
2. Omroepen via internet/app
3. Radiodeelplatformen (vb. TuneIn, iHeartRadio, …)
4. Muziekdeelplatformen (Spotify, Youtube, Deezer, …)
5. Andere, namelijk
6. Ik luister niet/heel zelden naar muziek, nieuws, podcasts

---

28. Hoe zou u de volgende platformen categoriseren?

a. Facebook, Instagram, LinkedIn

b. Snapchat, Twitter

c. VRT, RTBF, VTM, La Une

d. Whatsapp, Viber, Messenger, Telegram

e. Spotify, Apple Music, Deezer

f. Youtube, Vimeo, Dailymotion

g. Netflix, Amazon Prime Video, Disney+, Popcorn time, Stremio

h. Pornhub, YouPorn, XVideos

i. Playstation Games, Steam, Xbox Live

1. Communicatiekanaal (berichten sturen, bellen)
2. Sociaal netwerk
3. Kanaal om media te consumeren
4. Geen van deze

---

29. Hoe zou u zichzelf omschrijven?

1. Ik ben iemand die volledig mee is met de nieuwste digitale en technologische ontwikkelingen, en koop nieuwe producten/diensten zodra ze op de markt komen
2. Ik ben goed mee met de nieuwste digitale en technologische ontwikkelingen, en koop nieuwe producten/diensten wel vrij snel, maar niet als een van de eersten
3. Ik ben eerder gemiddeld op de hoogte van de nieuwste digitale en technologische ontwikkelingen, en wacht tot het product of de dienst succes heeft en zich bewezen heeft vooraleer het te kopen
4. Ik ben minder goed op de hoogte van de nieuwste digitale en technologische ontwikkelingen, en ben niet geïnteresseerd in het 'nieuw' zijn van het product/dienst; het is de kwaliteit die telt

---

S4. Bent u binnen uw gezin het gezinshoofd, m.a.w. de persoon die de grootste bijdrage levert aan het gezinsinkomen?

1. Ja, dat ben ik maar samen met mijn partner
2. Ja, dat ben ikzelf
3. Nee

S5. Wat is uw hoogst behaalde diploma?

S8. Wat is het hoogst behaalde diploma van het gezinshoofd?

1. Lagere school of geen enkel diploma
2. Lager secundair, algemeen (3 eerste jaren voltooid)
3. Lager secundair, technisch, kunstonderwijs of beroeps (3 eerste jaren voltooid)
4. Hoger secundair, algemeen (3 laatste jaren voltooid)

5. Hoger secundair, technisch of kunstonderwijs (3 laatste jaren voltooid)
6. Hoger secundair, beroeps (3 laatste jaren voltooid)
7. Kandidaat, bachelor (academisch of professioneel), graduaat
8. Licentiaat, master, postgraduaat, niet-universitair hoger onderwijs van het lange type
9. Licentiaat met aanvullend diploma, master na master
10. Doctoraat

S6. Wat houdt uw beroepsactiviteit precies in?

S9. Wat houdt de beroepsactiviteit van het gezinshoofd precies in?>

- **Zelfstandige**
    1. Landbouwer
    2. Ambachtsman, handelaar met 5 loontrekkende of minder
    3. Industrieel, handelaar met 6 loontrekkende of meer
    4. Vrij beroep
- **Bediende / Ambtenaar**
    5. Lid van de algemene directie, hoger kader - Verantwoordelijk voor 5 werknemers of minder
    6. Lid van de algemene directie, hoger kader - Verantwoordelijk voor 6 tot 10 werknemers
    7. Lid van de algemene directie, hoger kader - Verantwoordelijk voor 11 werknemers of meer
    8. Middenkader, geen deel uitmakend van de algemene directie - Verantwoordelijk voor 5 werknemers of minder
    9. Middenkader, geen deel uitmakend van de algemene directie - Verantwoordelijk voor 6 werknemers of meer
    10. Andere bediende die hoofdzakelijk kantoorwerk uitvoert
    11. Andere bediende die geen kantoorwerk uitvoert
- **Arbeider**
    12. Geschoolde arbeider, opzichter, ploegbaas
    13. Ongeschoolde arbeider, handenarbeid
- **Niet actief**
    14. Mindervalide, arbeidsongeschikt
    15. In prepensioen
    16. Gepensioneerd
    17. Student
    18. Huisvrouw / huisman
    19. Werkloos

S7. Wat was uw laatste beroepsactiviteit dan precies?

S10. Wat was de laatste beroepsactiviteit van het gezinshoofd dan precies?

- **Zelfstandige**
    1. Landbouwer
    2. Ambachtsman, handelaar met 5 loontrekkende of minder
    3. Industrieel, handelaar met 6 loontrekkende of meer
    4. Vrij beroep
- **Bediende / Ambtenaar**
    5. Lid van de algemene directie, hoger kader - Verantwoordelijk voor 5 werknemers of minder
    6. Lid van de algemene directie, hoger kader - Verantwoordelijk voor 6 tot 10 werknemers
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    10. Andere bediende die hoofdzakelijk kantoorwerk uitvoert
    11. Andere bediende die geen kantoorwerk uitvoert
- **Arbeider**
    12. Geschoolde arbeider, opzichter, ploegbaas
    13. Ongeschoolde arbeider, handenarbeid
- **Niet actief**
    14. Mindervalide, arbeidsongeschikt
    15.
    16.
    17. Student
    18. Huisvrouw / huisman
    19.
    20. Ik heb nooit gewerkt
    21. Andere

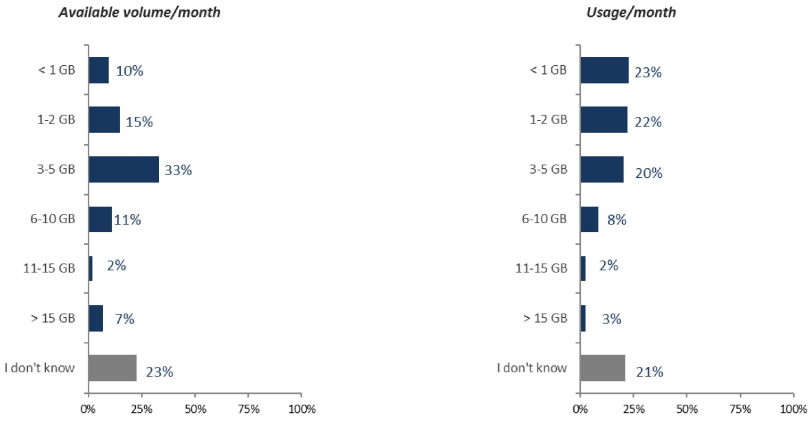
3. Survey outcome analysis

The main insights of the user survey have been summarized in a presentation available in the next section (4. Presentation of the user survey outcomes). The current section will further detail the results shown into the presentation.

MOBILE PENETRATION AND SUBSCRIPTION

The results show that 90% of Belgians own a smartphone, the largest penetration is observed in Brussel where 93% own a smartphone, then in Wallonia (91%) and, finally, in Flanders (90%). Such high penetration rate may rely on the segmentation used in the scope of this survey. Indeed, respondents above 80 years were screened out. It can be assumed that, if no upper age limit was set, the penetration rate would be lower as smartphone ownership lies lower in older age groups. Belgians own one SIM-card in most cases and have a large preference for postpaid rather than prepaid (8 out of the 10 own a subscription/postpaid). Barely 3% of the population have both a postpaid and prepaid subscription.

The monthly average expenses by Belgians for their phones reach 29 euros a month which is paid by 83% of the Belgians by their own or by a family member. One person out of five does not know how much monthly volume they have available on their mobile phone neither how much they use. Among the respondents who knew the data volume in their data package, more than a third have available volumes under or equal to 2GB. The second third lies between 3 to 5 GB. The remaining respondents have higher volumes on their data plan. Surprisingly, even though 21% of Belgians have a data subscription with apps which are not accounted in their mobile data consumption, nearly one out of three Belgians still exceed their data plan multiple times per year.



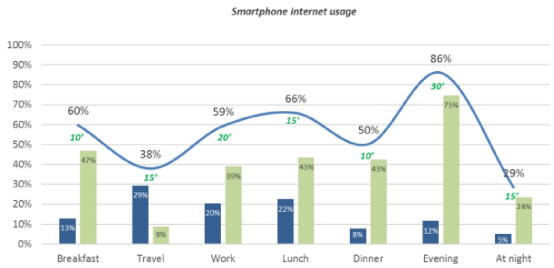
Question: "How much data do you own on a monthly basis?" & "How often do you exceed your data package?", N: 1210

CURRENT MOBILE DATA USAGE

The average smartphone screen time per day in Belgium equals to 1h53min50seconds. The time of the day where people mostly go online during workdays is in the evening where more than 8 out of 10 individuals (86%) go online. The second highest peak is at lunch, where two third of the Belgians consult their mobile phone to go online. These peaks are similar for all age groups except for the persons aged between 25-44 where more than 76% use their phone during workhours. Over the weekend, users mostly spread their usage and go online throughout the day between meal times.

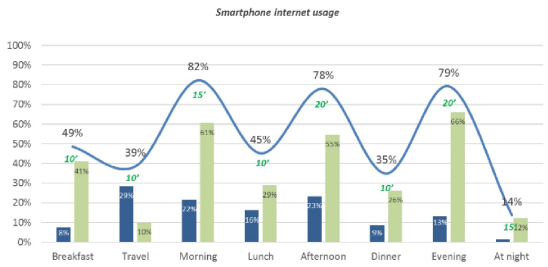
Belgians have a large preference for going online through Wi-Fi all day long rather than through mobile data. The only moment where the majority of the people switch to mobile data is during travel time (both during weekdays and weekends). Two other moments where mobile data is not performing too badly, however still worse than Wi-Fi, is while working (34%) and during lunch (week, 33%, and weekend, 35%). The ages also play a role in this preference. Indeed, younger age groups will more often have their mobile data on. The biggest difference is noticed at work (39% vs 27%) and lunch (40% vs 26%).

Week



N= 1079

Week-end



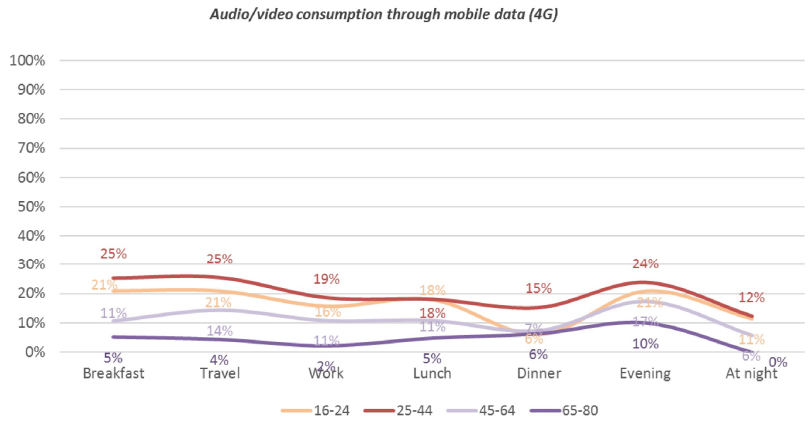
N=131

Question: "Have you been online at the following moments yesterday?" (Yes on mobile data, Wi-Fi or no) & "For how long you been online at the following moments yesterday?"

AUDIO/VIDEO CONSUMPTION

More than a third of Belgians use mobile data to consume audio/video throughout the day during weekdays. The three moments of the day where mobile data is most used for audio aim is in the evening (19% of respondents mostly driven by video), during travel time (18% of respondents mostly driven by audio) and when having breakfast (17% of respondents, both audio and video consumption). During weekends, the average time spent on audio and video is slightly lower, but the evening remains the favorite moment for video consumption and travel for audio consumption.

The older the age group, the less they consume audio/video on mobile data throughout the day (weekdays). Interestingly, the population aged between 16-24 consume less audio and video on mobile data at dinner time compared to the other age groups that all follow a similar audio/video consumption pattern (see chart hereunder).



Q: "Have you listened to audio or watched video's through mobile data" & "For how long have you listened to audio or watched video through mobile data?", N=1079, only the people who responded they have been on at least one of both the day before.

PLATFORM CONSUMPTION

Among the Belgians who are consuming audio/video on mobile data throughout the day, the most visited platforms are YouTube-like platforms (57%) and Facebook (53%). The three next platforms used to consume audio/video by around one person out of four are Spotify/Deezer/Apple Music (27%), Instagram (25%) and video sharing platforms (21%).

FUTURE MOBILE DATA USAGE

Belgians mostly make a conscious choice between mobile data and Wi-Fi (only 9% reject this statements). This may also be due to the price of mobile data which remains a barrier for increased consumption. Indeed, 74% of respondents answer that mobile data prices are very expensive once they exceed data packages. Similarly, almost half of the Belgians (49%) state that they may buy more mobile data if the price decreases.

Unclarity or indifference remains regarding the benefits in terms of safety, speed and quality among both options (Wi-Fi vs mobile data). Nearly half couldn't select one or the other as being safer or faster (43% are neutral on the choice between Wi-Fi and mobile data in terms of speed, and 51% in terms of safety). If the speed or quality increases in the future, only one out of four would be willing to pay more for mobile data.

The location has a large influence on the selection of Wi-Fi versus mobile data. Indeed, four out of five respondents will rather choose for Wi-Fi at home or switch between Wi-Fi and mobile data (16%). In public places, the split is quite equally divided between people going on Wi-Fi (36%), on mobile data (30%), or switching between both (34%).

A third to a quarter of Belgians are open to new mobile proposition and new technologies in the short/medium term. Indeed, approximately a third (35%) would be disposed to acquire an unlimited data subscription within this timeframe. One out of four (24%) would also acquire a 5G smartphone

even though it would be 100 to 200 euros more expensive. Finally, 10% of the participants would consider to cancel their digital TV subscription to consume TV via other platforms.

SUMMARY

Belgium has a high smartphone penetration with most people owning only one SIM card which is paid at their own expense (or at the expense of a family member). The fact that Belgians mostly pay their own subscription may fuel the choice for Wi-Fi over mobile data. Indeed, Belgians make a conscious choice between mobile data and Wi-Fi as the majority finds mobile data expensive. The time of day and, hence, the location also plays a quite important role in their choice. To illustrate, the mobile internet usage peaks in the evening but it happens in the vast majority over Wi-Fi as it can be assumed that people are at home. Younger age groups also prefer Wi-Fi over mobile data, however, they are using slightly more mobile data than older age groups. This is also visible in their audio/video consumption on mobile data which lies higher than other age groups.

4. Presentation of the user survey outcome

Cfr appendix 1bis

profacts
Revealing factors for success.

Current & future mobile data usage

Report for Capgemini by Profacts

Capgemini

Current & future mobile data usage

profacts
Revealing factors for success.

Background & methodology

Current mobile data usage

- Details mobile subscription
- Data usage throughout the day

Future mobile data usage

- Current barriers
- Future enablers

Key take-aways

Background & methodology

BIPT wants to map out the current & future mobile data usage.

- Profacts conducted an online survey among a gross sample of n=1.346 Belgians representative for the population (age 16-80). Consequently, people without smartphone were screened out (10%), resulting in a **net sample of n=1.210** representative for the smartphone population.

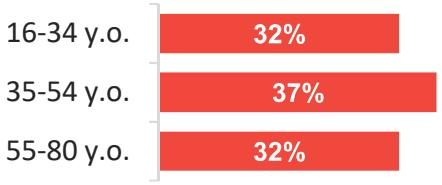
♂ 48%

♀ 52%

58%

10%

32%



(Proportions after weighting on Region x Age/Gender/Province)

Online survey | Q're length: 12' | 20/11 – 5/12 | n=1.210

Current & future mobile data usage

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Revealing factors for success.

Background & methodology

Current mobile data usage

- Details mobile subscription
- Data usage throughout the day

Future mobile data usage

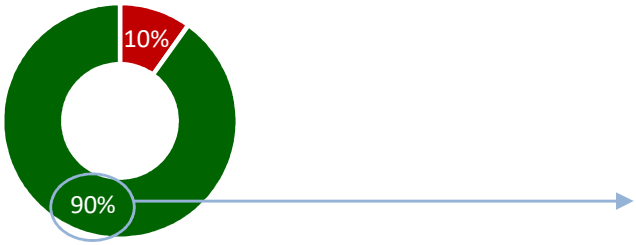
- Current barriers
- Future enablers

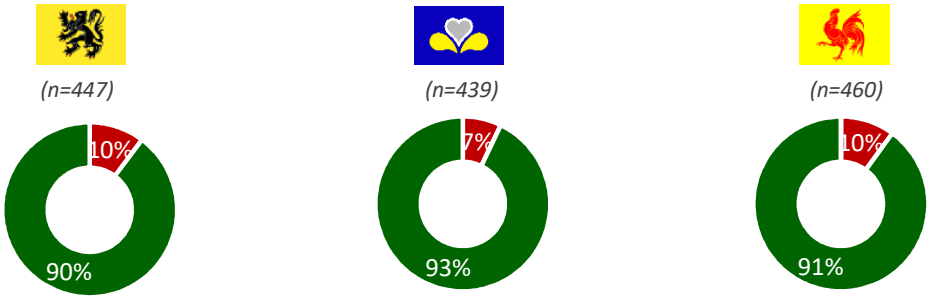
Key take-aways

Mobile subscription

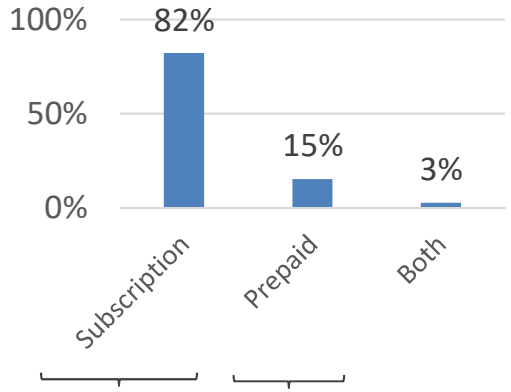
The current smartphone penetration is 90% in Belgium and seems to be comparable in the three different regions. Subscriptions are clearly preferred over prepaid cards.

Smartphone penetration





Type



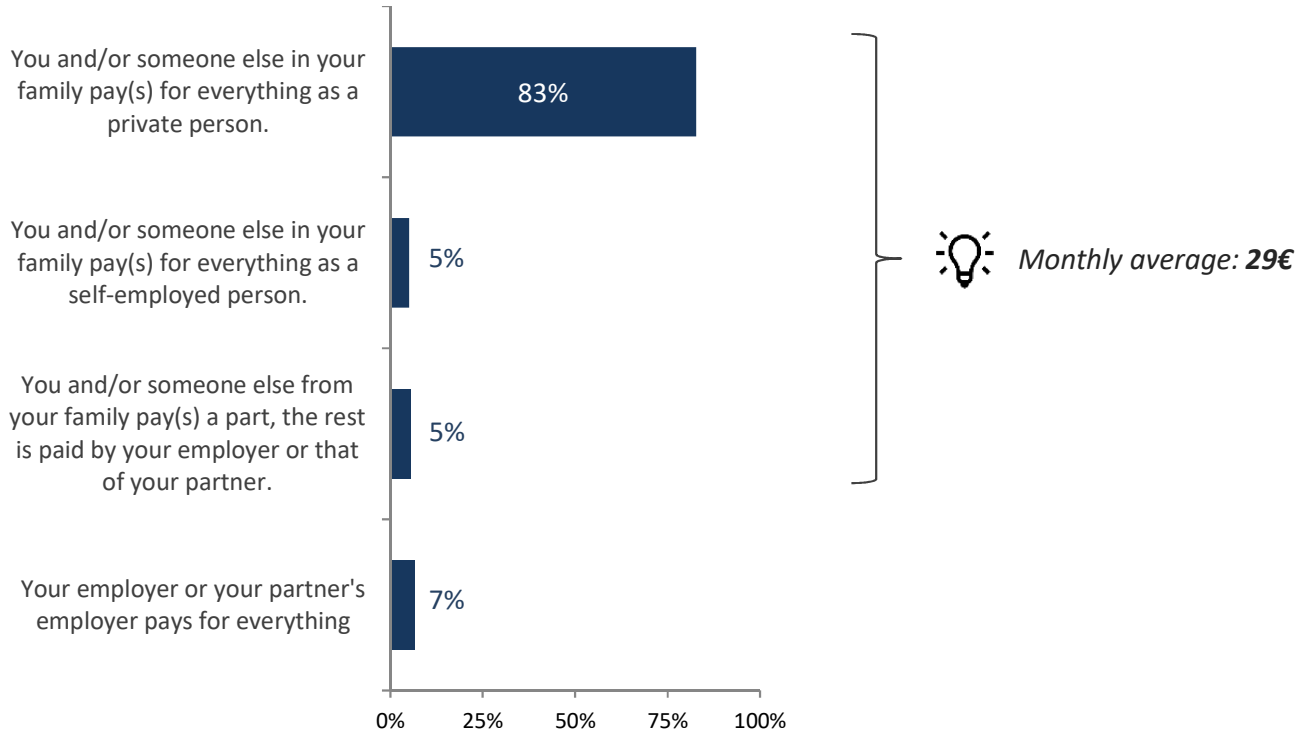
# of SIM cards		
1	*86%*	*80%*
2	*8%*	*10%*
3	*1%*	*2%*
>3	*3%*	*8%*

Base: Total sample

Mobile subscription

Most people pay themselves for their mobile phone expenses.

"Who <u>pays</u> for your mobile phone expenses?"

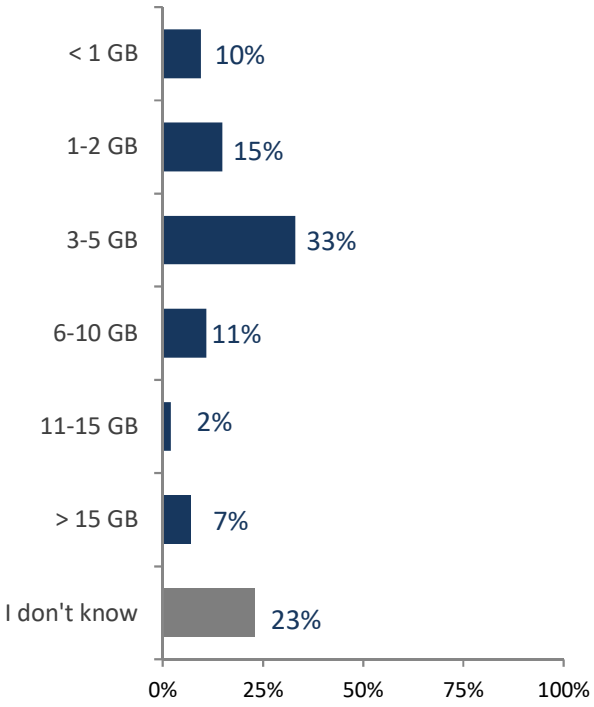


Base: Total sample

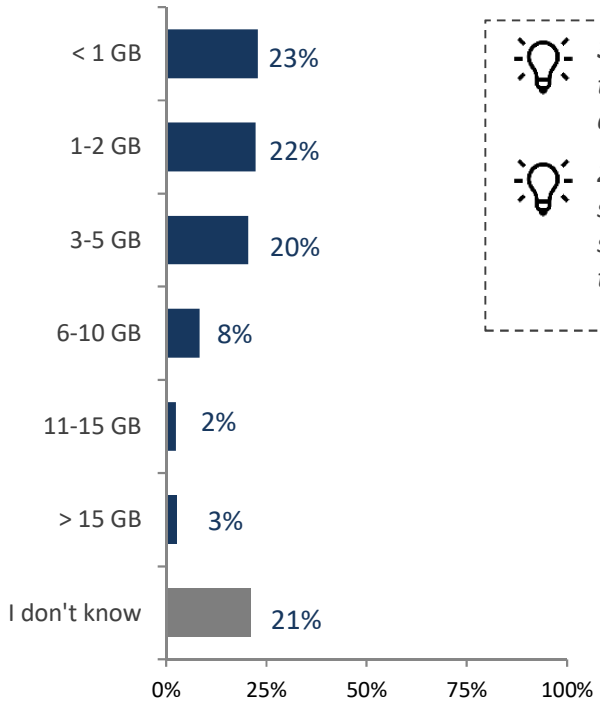
Mobile subscription

In general, data usage rarely exceeds 6 GB per month. Around 1 out of 5, however, is unaware of their monthly volume/usage.

Available volume/month



Usage/month



***32%** indicates to exceed their available data volume at least a few times a year.*

***21%** has a mobile subscription in which specific apps don't count in the data usage.*

Base: Total sample

Current & future mobile data usage

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Revealing factors for success.

Background & methodology

Current mobile data usage

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Key take-aways

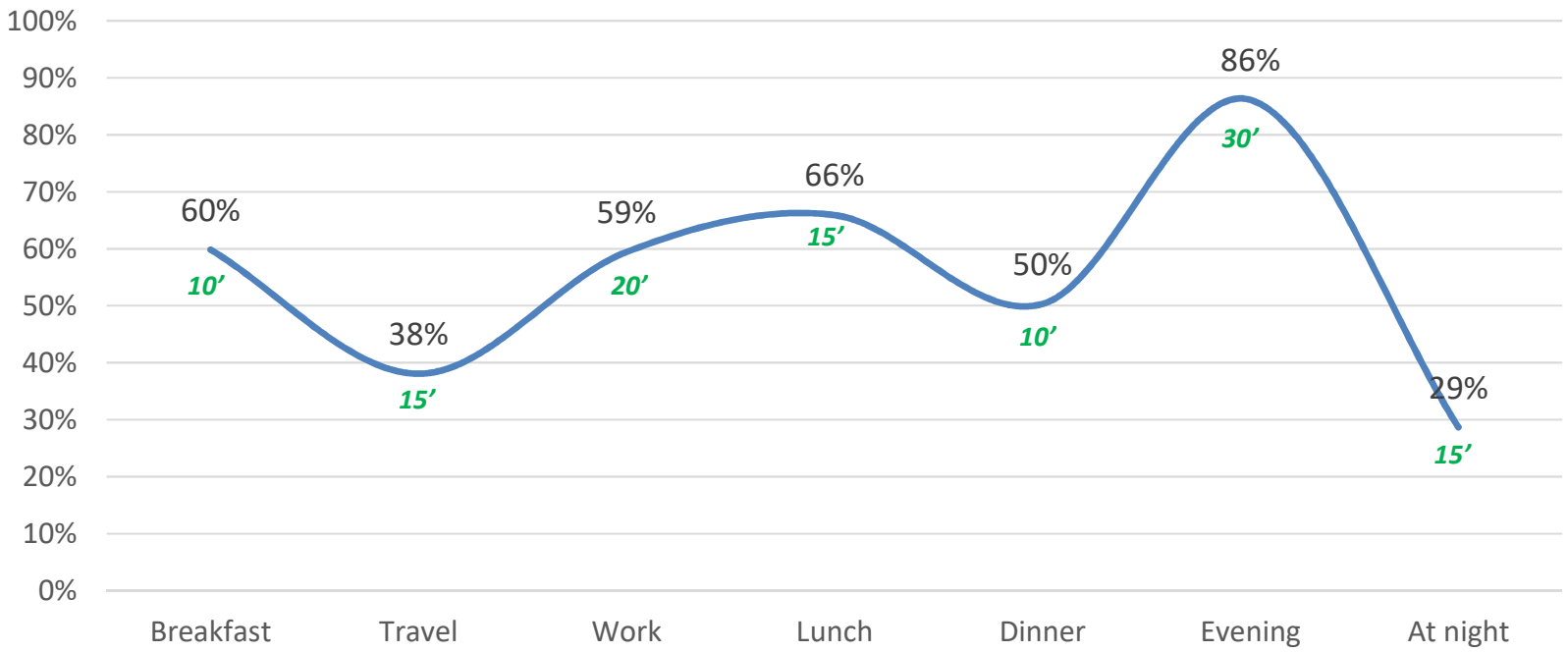
Data usage

Smartphones have become an indispensable part of people's lives: most people go online during various moments of the day (with a peak in the evening).

Week (n=1079)

Total smartphone screen time per day (median): 75'

Smartphone internet usage



Screen time (median)

Base: Total sample

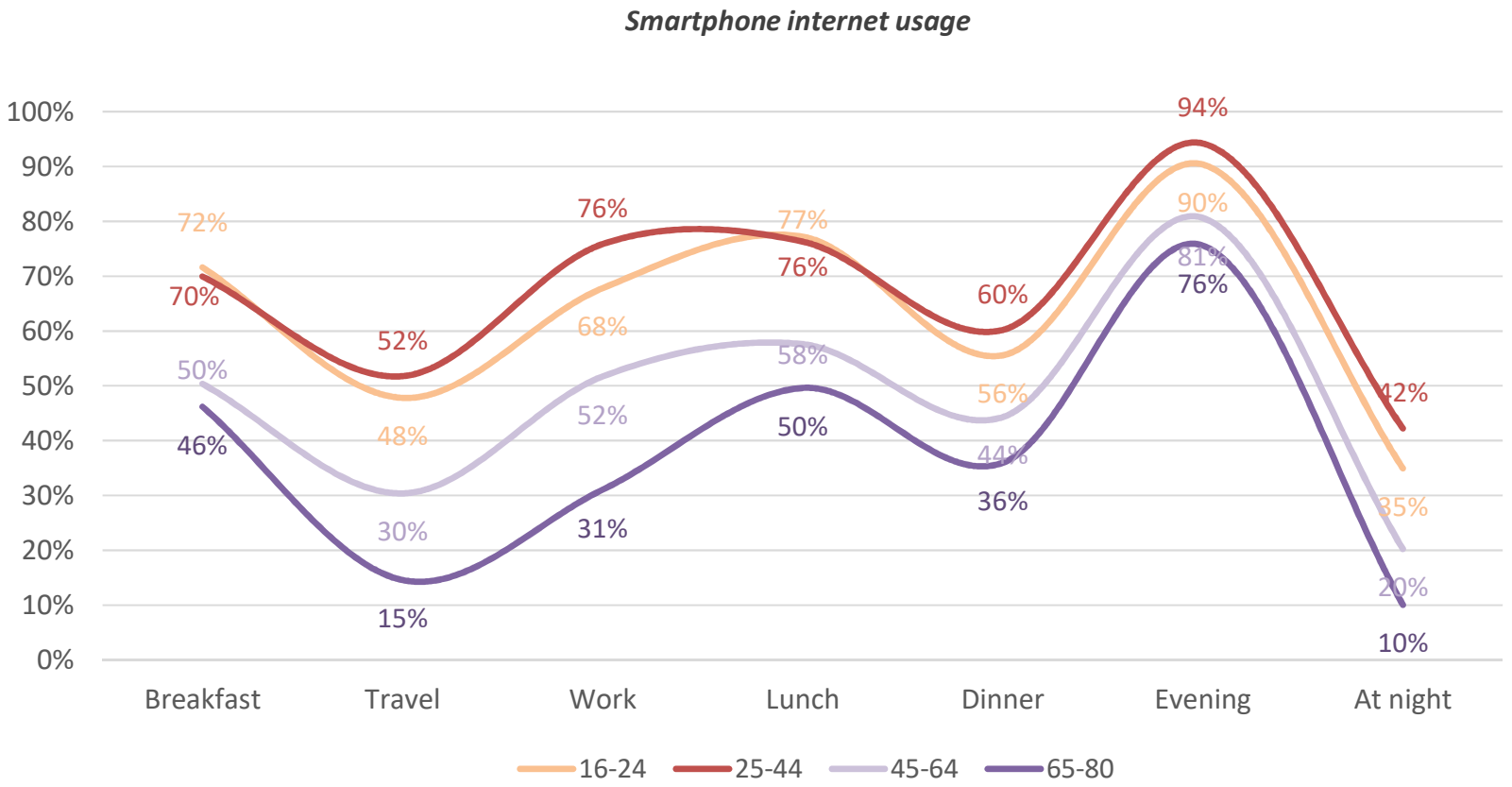
Data usage

Unsurprisingly, there is a strong age effect here: the screen time of the youngest age group is three times higher than that of the oldest group.

Week (n=1079)

Total smartphone screen time per day (median):

16-24: 120'
25-44: 100'
45-64: 58'
65-50: 40'



Base: Total sample

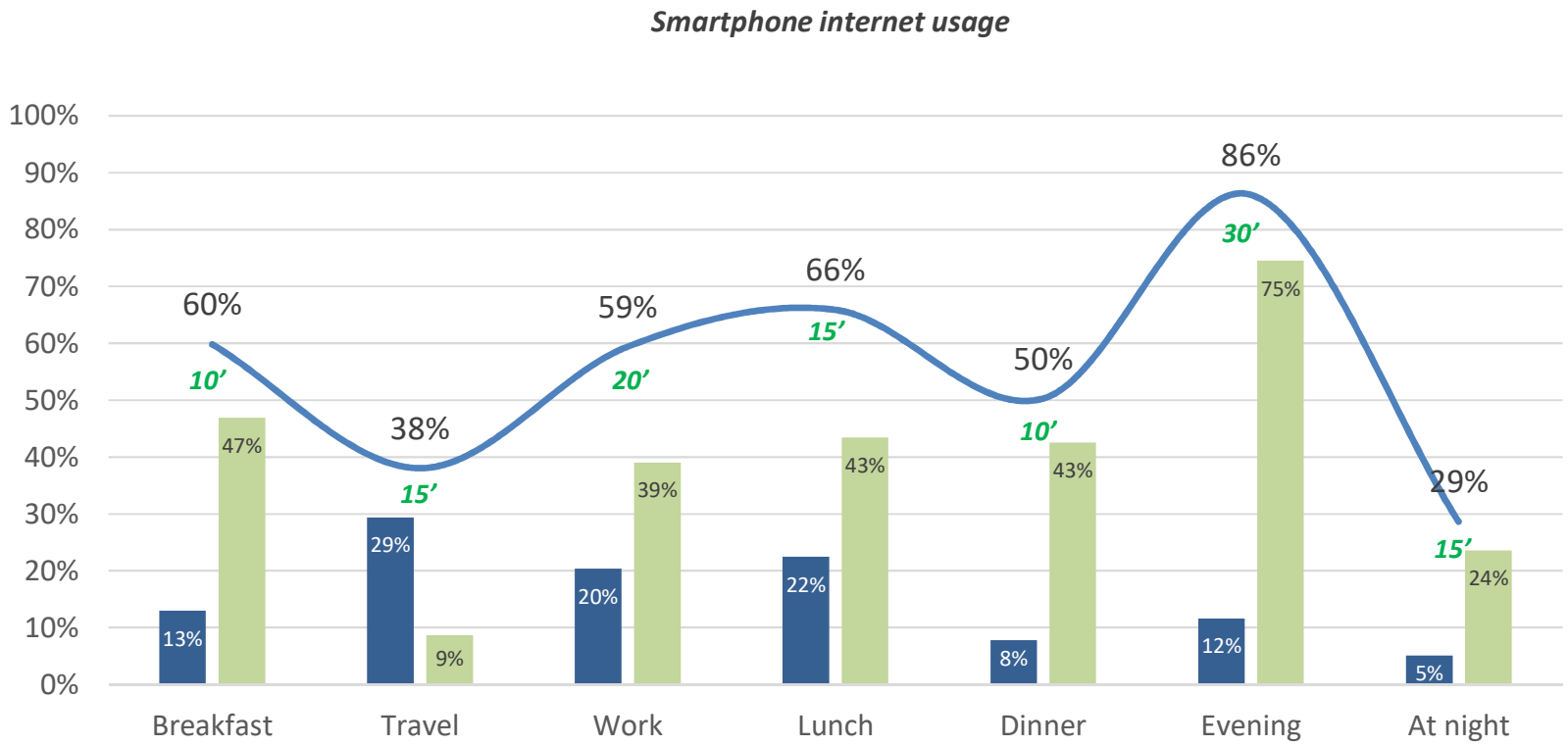
Data usage

People currently still strongly prefer connecting to Wifi instead of using mobile data.

Week (n=1079)

Total smartphone screen time per day (median):

Mobile data: 1’
Wifi: 52’



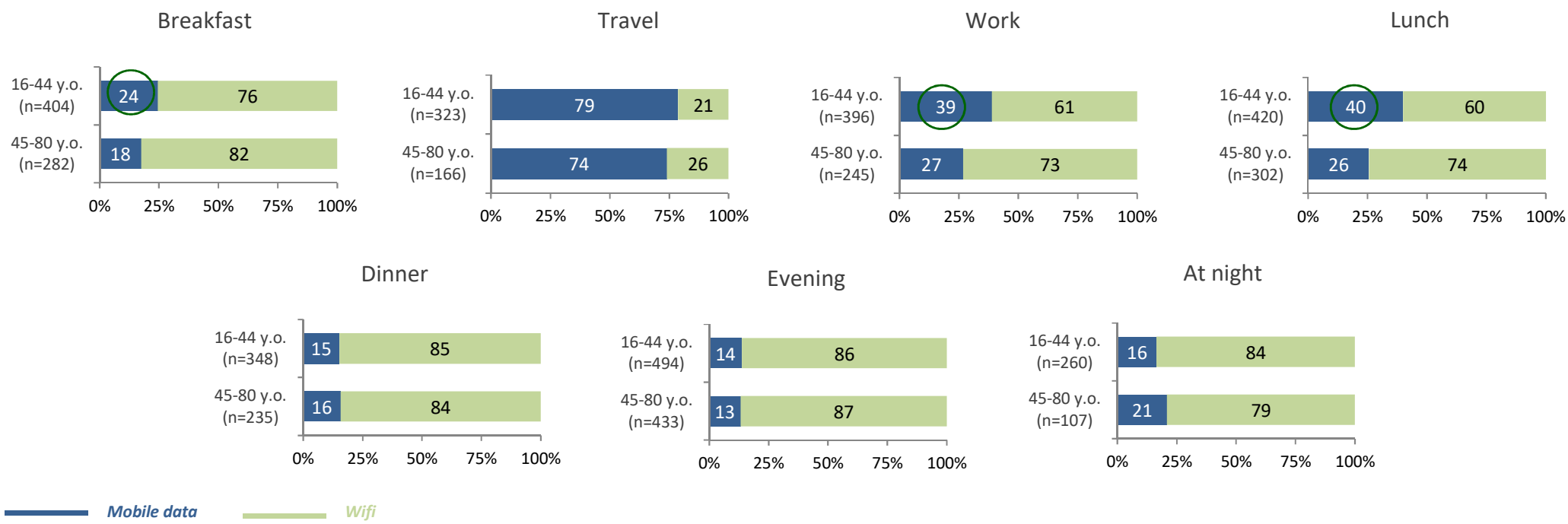
Base: Total sample

Data usage

Also among the younger generations, Wifi is the clear winner, although mobile data are somewhat more used.

Week (n=1000)

Mobile data vs. Wifi



Base: Went online

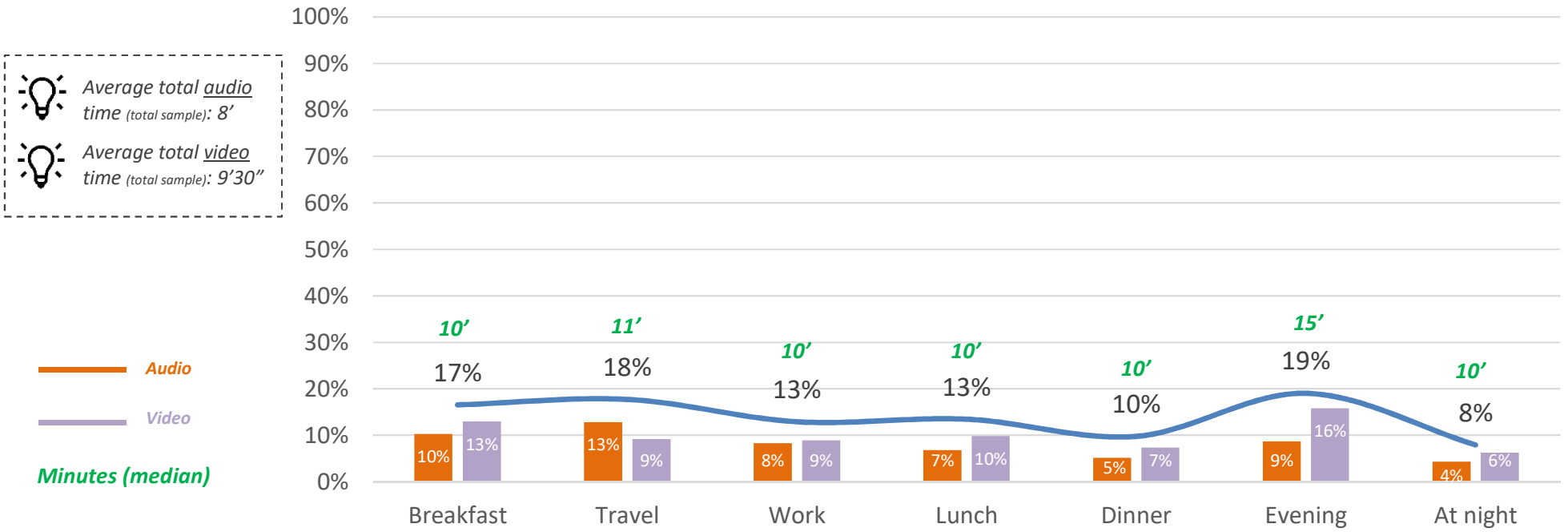
Significantly higher than other group

Data usage

In total, around 37% uses mobile data to consume audio/video throughout the day.

Week (n=1079)

Audio/video consumption through mobile data (4G)



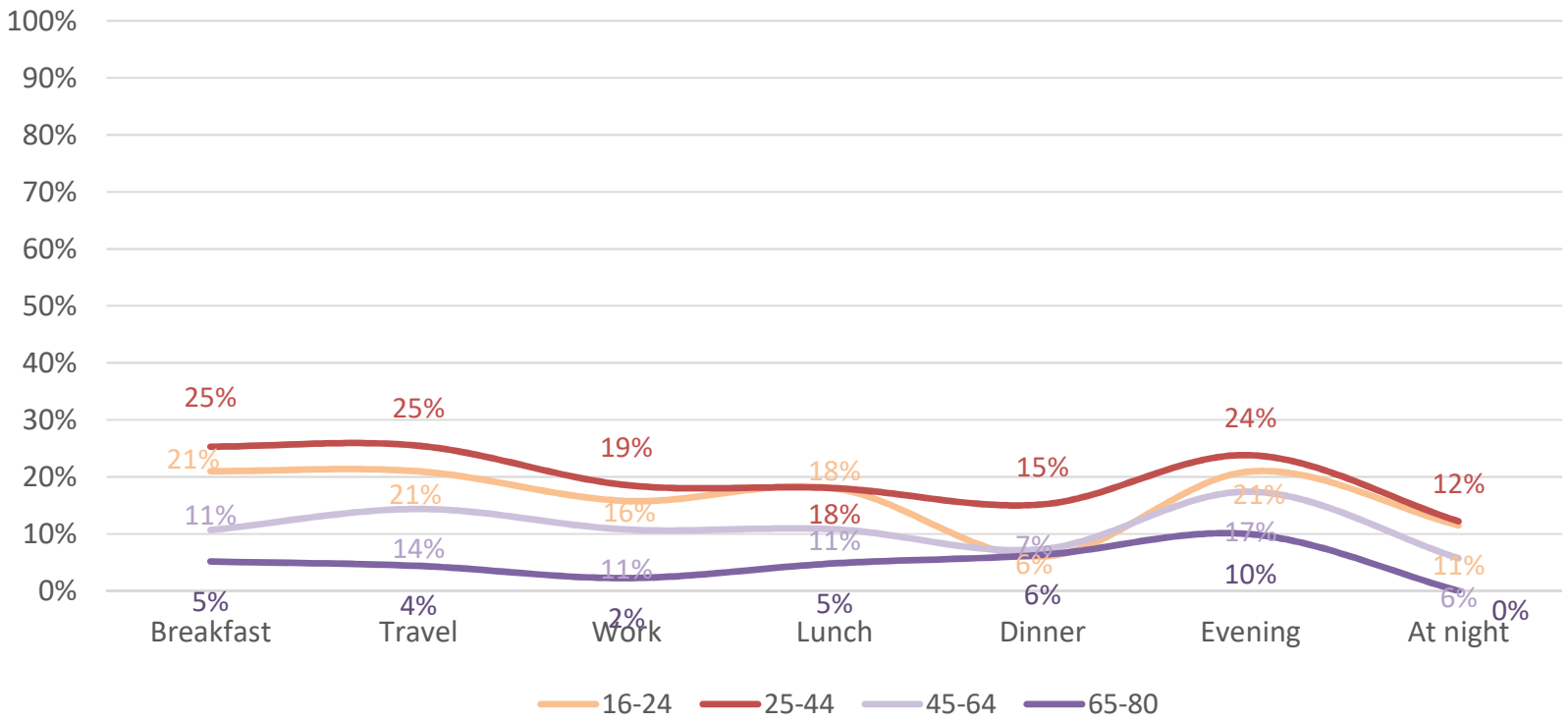
Base: Total sample

Data usage

Again, the age effect is apparent here.

Week (n=1079)

Audio/video consumption through mobile data (4G)



Audio/video consumption throughout the day:

16-24: 46%
25-44: 47%
45-64: 33%
65-50: 20%

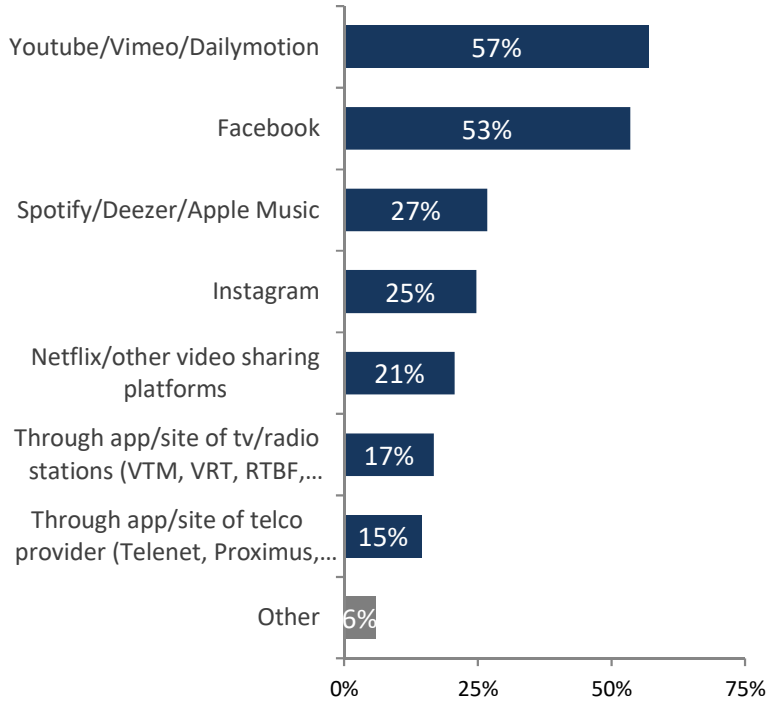
Base: Total sample

Data usage

Youtube and Facebook are the most frequently used platforms to consume audio/video through mobile data.

Week (n=461)

Audio/video consumption through mobile data – platforms used



Base: Consumed audio/video through mobile data

Current & future mobile data usage

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Background & methodology

Current mobile data usage

- Details mobile subscription
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Future mobile data usage

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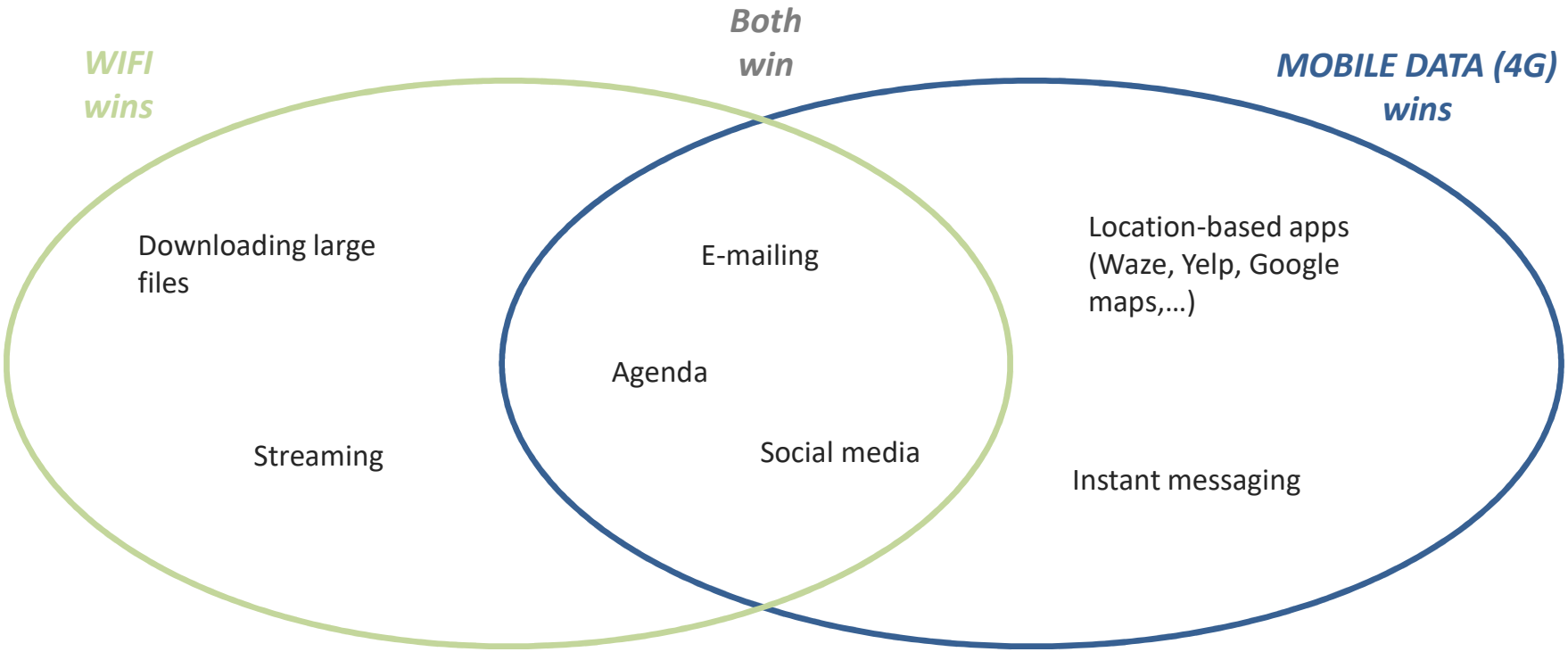
- Future enablers

Key take-aways

Current barriers

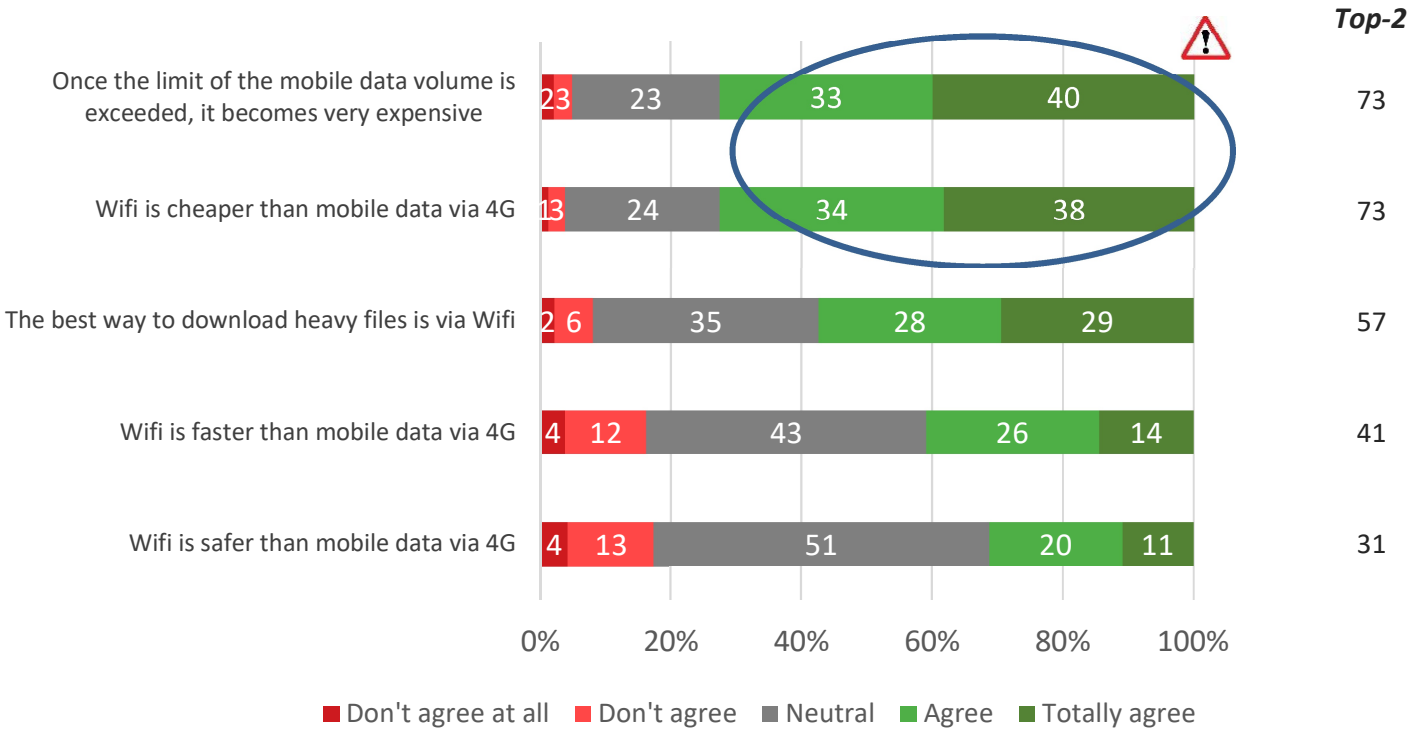
In terms of specific applications, the unique territory of Wifi is becoming smaller …



Current barriers

… but there is still a heavy price barrier that needs to be lifted to really stimulate mobile data usage.

"To what extent do you agree with the following statements?"

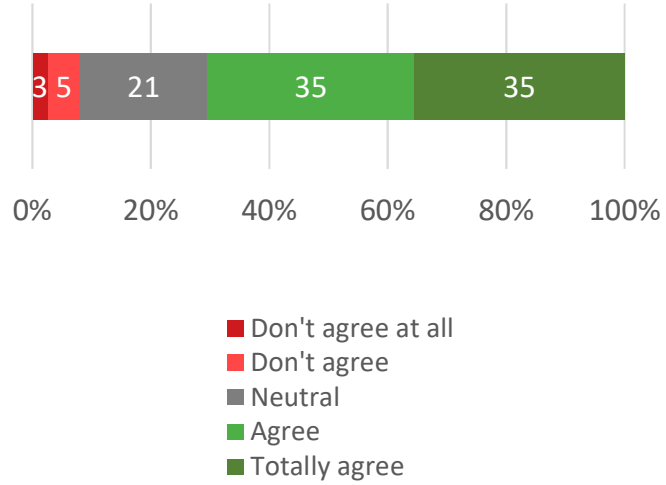


Base: Total sample

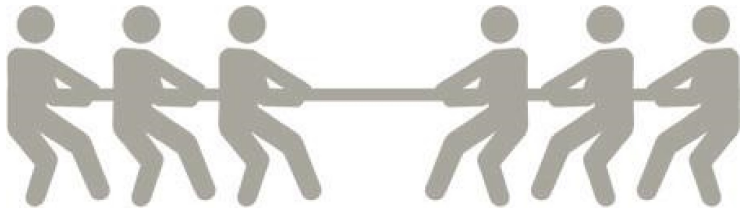
Current barriers

As a consequence, most people currently still make a conscious choice between Wifi and mobile data.

"To what extent do you agree with the following statement: I usually make a conscious choice between Wifi and 4G."



	I choose Wifi	I switch	I choose 4G
At home/work	80%	16%	4%
Public places	36%	34%	30%



Base: Total sample

Current & future mobile data usage

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Revealing factors for success.

Background & methodology

Current mobile data usage

- Details mobile subscription
- Data usage throughout the day

Future mobile data usage

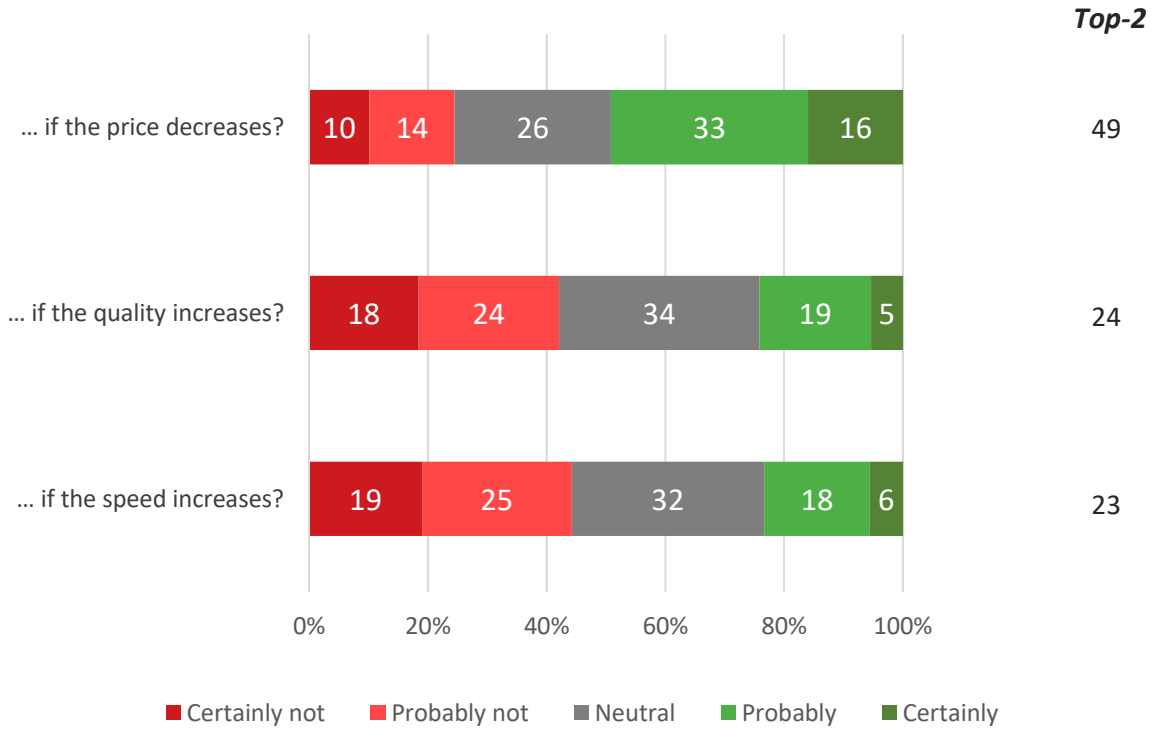
- Current barriers
- Future enablers

Key take-aways

Future enablers

Lifting the price barrier seems to be a major prerequisite for increased mobile data usage. Speed or quality are not the problem.

"In the future, would you be willing to buy more mobile data … "

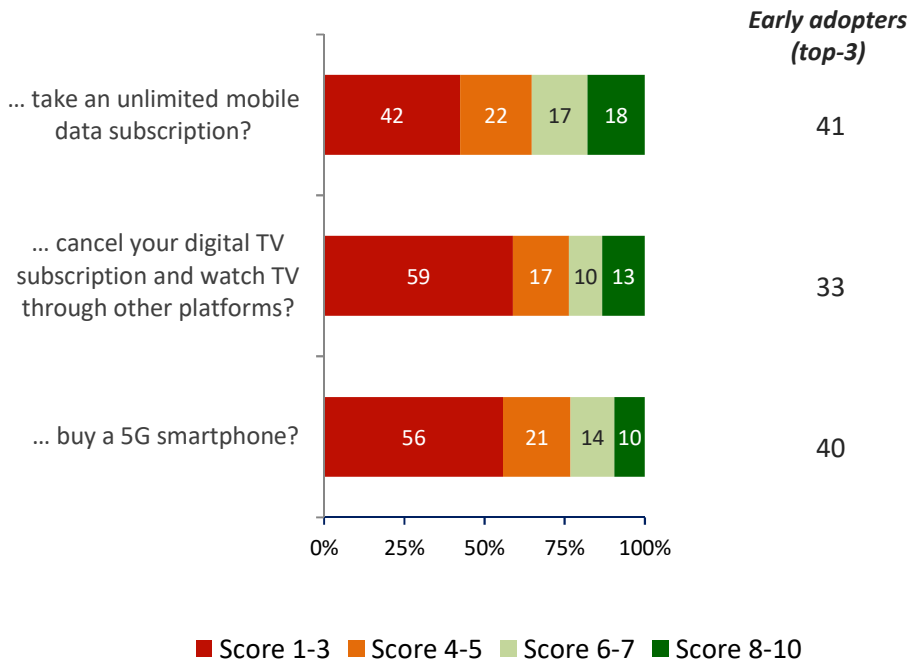


Base: Total sample

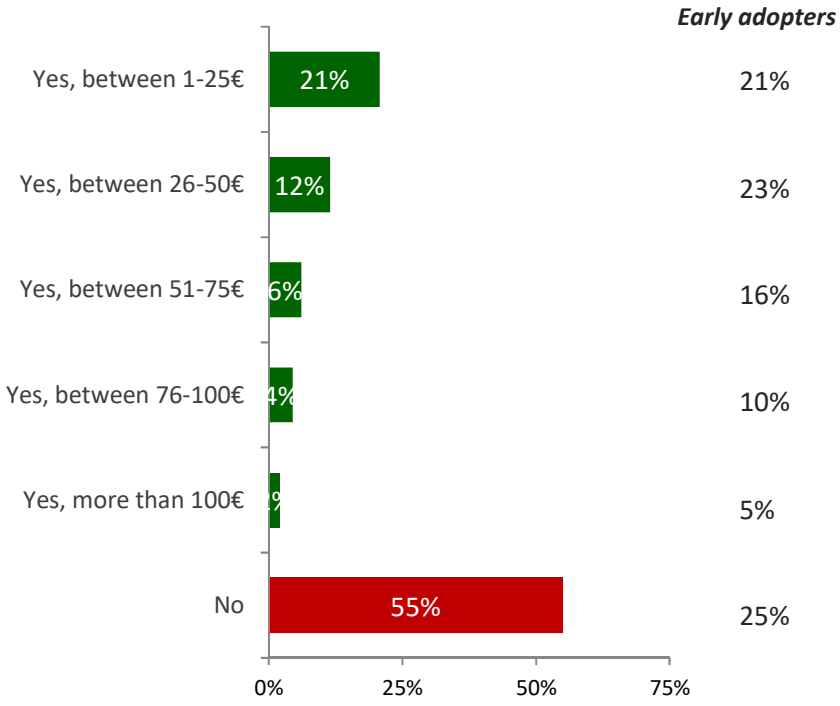
Future enablers

In terms of willingness to adopt new technologies, people are rather hesitant at the moment. They will first have to witness the concrete uses and possibilities.

"In the short/medium term, would you be willing to ... "



"In the future, would you be willing to increase your telco budget should these technologies offer more options?"



Base: Total sample

Current & future mobile data usage

profacts
Revealing factors for success.

Background & methodology

Current mobile data usage

- Details mobile subscription
- Data usage throughout the day

Future mobile data usage

- Current barriers
- Future enablers

Key take-aways

Key take-aways

1. Currently, most people still make a **conscious choice** between mobile data (4G) and **Wifi**. The latter is the clear winner in most situations throughout the day, especially when at home/work.

2. This clear preference for Wifi is somewhat lower among **younger age groups** and **early adopters**, though still overtly present.

3. At the moment, the major barrier for using more mobile data is the **price.** Quality, safety or speed don't seem to be the problem (anymore). Lifting this price barrier and the further development of **mobile-specific applications** could be considered the prerequisites for a stimulated mobile data use in the future.

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Revealing factors
for success.

Questions or feedback?

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Dans ce contexte évolutif et à la lumière de la jurisprudence développée par le Collège face à tous ces cas spécifiques, la recommandation sera régulièrement réévaluée et complétée afin qu'elle demeure une référence fiable.

2. Périmètre de la régulation : Analyse des sept critères déterminant l'existence d'un SMA

Comme cela a été exposé au point 1.2, l'existence d'un SMA implique la réunion de sept critères cumulatifs. Chacun de ces critères est analysé ci-après.

2.1. Critère du « service »

a) Notion de service

Pour être un SMA, il faut d'abord être un *service*.

Les travaux préparatoires du décret et la directive précisent que la notion de service doit s'entendre au sens du droit européen, dans lequel le service est défini comme un service *économique*, c'est-à-dire « *les prestations fournies normalement contre rémunération* »[13].

Ils indiquent également que la notion de service doit « *exclure les activités dont la vocation première n'est pas économique et qui ne sont pas en concurrence avec la radiodiffusion télévisuelle, comme les sites Web privés et les services qui consistent à fournir ou à diffuser du contenu audiovisuel créé par des utilisateurs privés à des fins de partage et d'échange au sein de communautés d'intérêt* »[14].

b) Explication du critère et exemples

Il ressort de ce qui précède que, pour déterminer si un média constitue un service économique au sens du droit européen, il convient de se poser deux questions :

- est-il offert en échange d'une rémunération ou contrepartie ?
- a-t-il une vocation économique, c'est-à-dire une ambition d'entrer en concurrence avec d'autres services ?

1°. La rémunération ou contrepartie :

En droit européen, la rémunération ou contrepartie est ce qui distingue la simple prestation non économique du service économique. Une prestation offerte moyennant contrepartie devient un service. Dès lors, pour pouvoir être qualifié de service, un média doit être offert moyennant contrepartie.

La notion de contrepartie requiert un rapport direct entre la prestation et sa rémunération. Par essence, la contrepartie est ce qui est offert *en échange de* la prestation de service. En dehors de cette exigence de rapport direct entre prestation et rémunération, aucune autre caractéristique n'est requise pour que l'on puisse parler de contrepartie.

Ainsi, la contrepartie ne doit pas nécessairement provenir du bénéficiaire du service[15]. Elle peut provenir de tiers pour autant qu'elle soit bien versée *en échange de* l'édition d'un média audiovisuel. Par exemple, lorsqu'un média audiovisuel est offert « gratuitement » au public grâce à un financement

[13] Articles 56 et 57 du Traité sur le fonctionnement de l'Union européenne.
[14] Considérant 21 de la directive coordonnée.
[15] CJUE, 26 avril 1988, Bond van Adverteerders e.a. c/ Etat néerlandais, aff. 352/85.

apporté par les annonceurs et/ou par les pouvoirs publics, on est en présence d'un service car même si le bénéficiaire de celui-ci – le public – n'offre aucune contrepartie, une contrepartie est bien assurée par les annonceurs qui paient pour que leur communication commerciale soit communiquée au public et/ou par les pouvoirs publics qui paient pour qu'un média de service public soit destiné à la population.

Par ailleurs, la contrepartie d'un média audiovisuel ne doit pas nécessairement être pécuniaire. Il peut s'agir d'une rémunération du service versée sous d'autres formes, par exemple via la mise à disposition de matériel, de contenus ou de données ayant une valeur économique.

Enfin, la contrepartie ne doit pas davantage être conséquente ou permettre à l'éditeur de réaliser un bénéfice[16]. Dès lors qu'il y a contrepartie, même lorsqu'elle est faible ou qu'il n'existe aucune volonté, dans le chef de l'éditeur, de réaliser un profit, il y a service. Le caractère lucratif de l'activité n'est pas pertinent. Dans ces conditions, il n'est donc pas nécessaire d'être constitué sous forme de société commerciale pour avoir la qualité d'éditeur de service : une ASBL ou une autorité publique peuvent parfaitement avoir cette qualité.

Sur cette base, l'on peut dresser une liste non exhaustive de personnes susceptibles, cumulativement ou pas, de fournir une contrepartie à l'édition d'un média :

- Le public : il fournit sa contrepartie soit en payant un abonnement, soit via un système de « pay per view », soit, plus subtilement, en communiquant à l'éditeur des données personnelles dont ce dernier pourra faire un usage économique (par exemple, lorsque l'éditeur d'un service l'offre moyennant une inscription gratuite mais nécessitant de remplir un formulaire avec des données que l'éditeur pourra utiliser à des fins promotionnelles) ;
- Les annonceurs : ils fournissent leur contrepartie en versant à l'éditeur des moyens en l'échange de la diffusion de différentes formes de communication commerciale (publicité, parrainage, télé-achat ou placement de produit) ;
- Les donateurs et sympathisants : ils fournissent leur contrepartie en accordant des fonds à l'éditeur parce que, pour une raison qui leur est propre, ils souhaitent que celui-ci édite un média audiovisuel ;
- Les pouvoirs publics : ils fournissent leur contrepartie en versant à l'éditeur une dotation, des subsides ou en mettant à sa disposition du matériel ou des locaux. Le fait qu'un média soit financé par des fonds publics et constitue, le cas échéant, un média « de service public », ne lui ôte pas sa qualité de service économique. En effet, hormis certaines activités bien particulières qui relèvent de l'exercice de la puissance publique[17] ou qui poursuivent un objectif exclusivement social[18] ou éducatif[19], les activités exercées par les pouvoirs publics peuvent généralement être considérées comme des services. Le Tribunal de l'Union européenne a d'ailleurs jugé que le service public de la radiodiffusion doit être considéré comme un service économique, et ce essentiellement en raison de son impact sur le secteur plus global de la radiodiffusion, lui-même concurrentiel et marchand[20].

2°. La vocation économique et la concurrence avec d'autres services :

[16] CJUE, 18 décembre 2007, Hans-Dieter Jundt et Hedwig Jundt c/ Finanzamt Offenburg, aff. 281/06.
[17] Par exemple, les activités de contrôle aérien, voy. CJUE, 19 janvier 1994, SAT Fluggesellschaft mbH c/ Eurocontrol, aff. 364/92.
[18] Par exemple, les organismes de sécurité sociale, voy. CJUE, 17 février 1993, Christian Poucet c/ Assurances Générales de France et Caisse Mutuelle Régionale du Languedoc-Roussillon, aff. 159/91 et 160/91.
[19] Par exemple, les activités d'enseignement public, voy. CJUE, 27 septembre 1988, Etat belge c/ René Humbel et Marie-Thérèse Edel, aff. 263/86.
[20] TUE, 26 juin 2008, Sociedade Independente de Comunicação SA c/ Commission, aff. 442/03.

Dans la pratique, la grande majorité des médias répondant aux six autres critères de la notion de SMA sont offerts moyennant une contrepartie apparente (communication commerciale, accès conditionné à un paiement, etc.).

Dans certains cas, cependant, il se peut que l'existence d'une contrepartie ne soit pas évidente, voire fasse défaut.

Dans ce cas, le média pourra néanmoins se voir qualifié de service s'il affiche une vocation économique, c'est-à-dire une ambition de concurrencer des SMA.

En effet, dès lors qu'un média est concrètement capable d'entrer en concurrence avec des SMA, il offre des prestations qui, au sens du droit européen, sont fournies *normalement* – si pas dans le cas d'espèce – contre rémunération. En outre, comme cela a été exposé dans l'introduction de la présente recommandation, les objectifs de la régulation imposent que, pour deux médias entrant en concurrence pour le même public, les contraintes soient les mêmes afin d'assurer entre eux une concurrence loyale et de répondre aux attentes légitimes du consommateur en matière de protection.

La question de savoir si un média a une vocation économique et entre en concurrence avec des SMA est une question qui devra s'apprécier au cas par cas et de manière évolutive. En effet, un média qui, dans un premier temps, est lancé sans vocation économique peut, avec le temps et en fonction de certaines circonstances, acquérir la qualité de service en entrant peu à peu en concurrence avec des SMA.

2.2. Critère de la « responsabilité éditoriale »

a) Notion de responsabilité éditoriale

Pour être un SMA, il faut être édité sous la responsabilité éditoriale d'un éditeur.

Le décret définit la responsabilité éditoriale comme « *l'exercice d'un contrôle effectif tant sur la sélection des programmes que sur leur organisation, soit sur une grille chronologique, dans le cas de services linéaires, soit sur un catalogue dans le cas de services non linéaires* »[21].

Celui qui exerce ce contrôle sera considéré comme l'éditeur du service et, partant, sera responsable de veiller au respect, par le service, des exigences décrétales.

b) Explication du critère et exemples

L'existence d'une responsabilité éditoriale implique la réunion de trois éléments : l'exercice d'un *contrôle effectif* sur la *sélection* et l'*organisation* des programmes.

1° Le contrôle effectif :

La notion de contrôle effectif n'implique pas nécessairement qu'un contrôle soit, en pratique, exercé à tout moment. En effet, il n'est pas souhaitable qu'une personne puisse échapper aux obligations imposées par le décret en se prévalant de sa négligence à contrôler son service.

La notion de contrôle effectif implique cependant qu'il n'y ait pas eu de renonciation générale à l'exercice de tout contrôle[22]. Si une plateforme diffusant des contenus audiovisuels est proposée au

[21] Article 1er, 46° du décret.

public sans que personne ne se soit réservé la possibilité de maîtriser la sélection et l'organisation des contenus, ce service doit être exclu de la notion de SMA.

2° La sélection des programmes :

Le contrôle effectif sur la sélection des programmes recouvre le choix d'intégrer ou non certains programmes dans le service.

Il ne s'agit pas d'aller jusqu'à déterminer le contenu même des programmes (ce qui relève plutôt du producteur) mais il s'agit d'aller plus loin que de simplement choisir une grille ou un catalogue de programmes déjà constitué (ce qui relève plutôt du distributeur).

La sélection implique de décider du profil du service. Aussi, le simple pouvoir de refuser l'inclusion de tel ou tel programme dans le service pour des raisons techniques ou d'espace disponible n'est pas considéré comme un contrôle sur la sélection des programmes. La sélection implique soit de rechercher soi-même les programmes qui vont être inclus dans le service, soit, lorsqu'ils sont proposés par des tiers, de les choisir en fonction de critères liés à leur contenu, afin qu'ils correspondent au profil spécifique du service. Le pouvoir de sélection implique donc un jugement de valeur quant à ce qui doit figurer dans le service.

Lorsque la sélection des programmes est décidée par plusieurs personnes successivement, c'est celle qui décide en dernière instance de ce qui est diffusé qui est considérée comme l'éditeur[23].

3° L'organisation des programmes :

Le contrôle effectif sur l'organisation des programmes recouvre le choix des modalités d'intégration des programmes dans le service.

Pour les services linéaires, il y a responsabilité éditoriale lorsqu'une personne exerce un contrôle sur l'agencement chronologique des programmes dans une grille. Par opposition, la retransmission simultanée, non remaniée et intégrale d'un programme n'entraîne pas la responsabilité éditoriale du prestataire. Ainsi, par exemple, un service consistant à diffuser en direct des images montrant la couleur du ciel sur des pistes de ski ou l'état de la circulation dans une ville donnée sera considéré comme dépourvu de responsabilité éditoriale et donc comme exclu de la notion de SMA.

Pour les services non linéaires, il y a responsabilité éditoriale lorsqu'une personne exerce un contrôle sur la manière dont les programmes sont présentés dans le catalogue. Comme la sélection, l'organisation implique plus qu'une simple intervention technique mais requiert un jugement de valeur sur le contenu des programmes.

Ainsi, ne sera pas, par exemple, considéré comme une organisation des programmes le fait d'assurer le design de l'interface et/ou la conception d'un système de navigation dans le catalogue, via un moteur de recherche simple ou un classement des programmes par ordre alphabétique.

En revanche, sera considéré comme une organisation des programmes le fait de les classer en fonction de leur contenu. Le prestataire qui agrémente les programmes de son catalogue d'un résumé, d'une appréciation ou d'avertissements (par exemple quant au contenu violent ou sexuellement explicite du programme) et qui permet à l'utilisateur de faire son choix sur la base de ces critères sera considéré

[22] W. SCHULZ et St. HEILMANN, « La responsabilité éditoriale », *IRIS Spécial de l'Observatoire européen de l'audiovisuel*, 2008, p. 16.
[23] W. SCHULZ et St. HEILMANN, *op. cit.*, p. 17-23.

comme éditorialement responsable. La force suggestive du prestataire quant au choix des programmes par le public est un élément important dans la détermination de sa responsabilité éditoriale.

En général, le contrôle sur la sélection et l'organisation des programmes est assuré par un seul et même prestataire. Toutefois, il se peut que ces deux activités soient, parfois, accomplies par des personnes différentes. Or, tant la directive que le décret SMA n'envisagent la responsabilité éditoriale que comme ne pouvant être endossée que par une seule personne. Il convient dès lors de trancher entre sélectionneur et organisateur de contenus pour déterminer qui endossera la responsabilité éditoriale.

Le Collège estime que, dans ce type de cas, c'est l'activité d'*organisation* des contenus qui devra être considérée comme prépondérante pour identifier le titulaire de la responsabilité éditoriale. En effet, le Collège ne partage pas l'analyse selon laquelle la personne en charge de la sélection des contenus est la plus apte à faire en sorte que les règles applicables au service soient respectées[24]. Elle est, certes, mieux placée pour veiller au respect de certaines règles comme, notamment, l'article 9 du décret qui interdit la diffusion de certains programmes préjudiciables mais, si l'on tient compte de la globalité des règles applicables aux SMA, il faut remarquer que celles qui posent le plus souvent question relèvent de l'*organisation* des contenus. Ainsi, c'est l'organisateur des contenus qui, dans le domaine de la protection des mineurs, sera chargé de veiller à la bonne signalétique, à la diffusion à une heure appropriée ou, en VOD, à la mise en place d'un mécanisme de contrôle parental. En matière de communication commerciale, c'est lui qui veillera à ce qu'elle ne dépasse pas un certain seuil horaire ou par programme, qu'elle n'interrompe pas certains programmes ou qu'elle fasse l'objet d'une identification appropriée. En matière de quotas musicaux, c'est encore lui qui veillera à ce que les morceaux entrant dans le quota et sélectionnés par un tiers soient diffusés de manière suffisamment récurrente. C'est donc la personne en charge de l'organisation des contenus qui, dans de tels cas de dissociation entre sélection et organisation, assumera la responsabilité éditoriale.

* * *

Sur cette base, l'on peut dresser une liste – non exhaustive – de services pour lesquels l'on considérera, en principe, qu'il n'existe pas de responsabilité éditoriale :

- Les plateformes d'échange de contenus générés par les utilisateurs (par exemple Youtube, Dailymotion) : les vidéos ne sont en effet ni sélectionnées (n'importe qui peut poster une vidéo sans contrôle préalable) ni organisées en fonction de leur contenu. Même si ces plateformes exercent un contrôle secondaire sur le contenu de leurs sites, à partir du moment où l'intervention a lieu *ex post* (sur la base de plaintes des utilisateurs par exemple) et qu'elle n'implique pas une sélection active *ex ante*, ce contrôle n'est pas considéré comme de la responsabilité éditoriale au sens de la directive SMA[25].
  A cet égard, il faut toutefois remarquer qu'une plateforme unique (comme par exemple un site web) n'implique pas nécessairement un service unique. En vertu du principe de neutralité technologique, dès lors qu'un catalogue de programmes cohérent et susceptible d'avoir une existence autonome peut être identifié, il constitue un service à part entière. Aussi, si une plateforme de contenus générés par les utilisateurs est utilisée par un utilisateur, dans un

[24] Voy., à ce sujet, O. HERMANNS et P. MATZNELLER, « Whose boots are made for walking ?, La régulation des services audiovisuels à la demande », in *IRIS Spécial – La réglementation des services audiovisuels à la demande : chaos ou cohérence ?*, Observatoire européen de l'audiovisuel, 2011, p. 17 et M. BETZEL, « L'affinement des critères de classification des services de médias audiovisuels à la demande : l'approche des Pays-Bas », in *IRIS Spécial – La réglementation des services audiovisuels à la demande : chaos ou cohérence ?*, Observatoire européen de l'audiovisuel, 2011, p. 67.

[25] L. GARZANITI, *Telecommunications, broadcasting and the Internet EU competition law & regulation*, 3ème éd., Sweet & Maxwell, Londres, 2010, p. 276.

partenariat avec la plateforme, pour héberger un catalogue cohérent et autonome de contenus dont il assure la sélection et l'organisation, ce catalogue peut, malgré son hébergement sur un service sans responsabilité éditoriale, être considéré, lui, comme un service à part entière se trouvant sous la responsabilité éditoriale d'un éditeur (par exemple, les « branded channels » hébergées sur Youtube ou BBC Worldwide qui a sa propre chaîne hébergée sur Youtube[26]).

- Les bases de données de vidéos à la demande composées à l'aide d'un moteur de recherche (par exemple Google vidéos).
- Les services offrant la retransmission simultanée et intégrale d'images et/ou de sons sans qu'il n'y ait d'intervention éditoriale (par exemple les services diffusant des images de caméras de surveillance installées sur des pistes de ski ou destinées à filmer l'évolution du trafic routier).

Pour les autres types de services, l'existence d'une responsabilité éditoriale devra être appréciée au cas par cas[27].

2.3. Critère de l'« objet principal »

a) Notion d'objet principal

Pour être un SMA, il faut avoir pour objet *principal* la communication au public de programmes télévisuels ou sonores.

Les travaux préparatoires du décret précisent que doivent être exclus les services dont le contenu audiovisuel est secondaire comme, par exemple, *« certains sites Web qui ne contiennent des éléments audiovisuels qu'à titre accessoire, comme des éléments graphiques animés ou de brefs spots publicitaires ou des programmes télévisuels ou sonores comme on peut en trouver sur les sites électroniques des journaux et des magazines de la presse écrite »*.

Il est cependant précisé qu' *« un service qui proposerait à la fois de l'écrit et à la fois des programmes télévisuels ou sonores n'est pas automatiquement exclu du champ de la définition, ceci dépendant de la proportion et du poids (l'intérêt pour le public) de ces programmes dans le service »*[28].

b) Explication du critère et exemples

Pour déterminer si le contenu d'un service est bien principalement audiovisuel, une double démarche doit être accomplie : il faut, premièrement, identifier le service et, deuxièmement, déterminer s'il est principalement audiovisuel.

1° L'identification du service :

[26] Observatoire européen de l'audiovisuel, Annuaire, Cinéma et vidéo, Volume 3, 2010, p. 104.

[27] Ainsi, par exemple, pour les jeux en ligne (MMORPG) et mondes virtuels, l'existence d'une responsabilité éditoriale dans le chef du créateur du jeu dépendra de l'ampleur de la marge de manœuvre dont disposent effectivement les joueurs. Dans l'hypothèse d'un scénario préconçu où les joueurs ne font, par leurs actions, que déclencher des évènements ou séquences imaginées par les créateurs du jeu, l'on doit admettre que ces derniers ont véritablement exercé un contrôle éditorial. A l'inverse, le résultat d'interactions entre joueurs qui sortent du cadre du scénario préprogrammé ne relève pas de la responsabilité éditoriale des concepteurs du jeu. Enfin, sur des plateformes ouvertes telles que Second Life, où tous les contenus sont créés par les utilisateurs, il ne paraît pas pertinent de considérer que les créateurs exercent une responsabilité éditoriale. De telles plateformes sont cependant, tout comme Youtube, susceptibles d'héberger des créations interactives qui pourraient manifester l'exercice d'une responsabilité éditoriale dans le chef de leur concepteur (voy. P-F. DOCQUIR, « Donjons et législations, ou les avatars du droit dans les mondes virtuels », *R.D.T.I.*, 2010, p. 96-97).

[28] *Doc. Parl.*, P.C.F., 2008-2009, n° 634/1, pp. 7-8.

Comme cela a été précisé lors de l'examen du critère de la responsabilité éditoriale, une plateforme de diffusion unique n'équivaut pas toujours à un service unique. En effet, en vertu du principe de la neutralité technologique, le simple choix d'une plateforme permettant de diffuser des contenus de nature audiovisuelle et de nature autre (par exemple un site web) ne doit pas conduire un service à échapper à la régulation des SMA, si ses contenus audiovisuels étaient « dilués » dans des contenus autres.

Pour cette raison, lorsqu'une plateforme unique (par exemple un site web) comprend à la fois des contenus audiovisuels et d'autres contenus, il convient de se demander si ces contenus audiovisuels sont susceptibles de former une offre cohérente pouvant exister de manière autonome.

Deux cas de figure peuvent se présenter.

Première possibilité, les contenus audiovisuels peuvent être isolés sous forme d'un catalogue cohérent et susceptible d'avoir une existence autonome. Dans ce cas, ils pourront être considérés comme un service à part entière qui pourra, s'il remplit les six autres critères de la définition, être qualifié de SMA. C'est le cas, par exemple, lorsqu'un site web comporte une section spécifique réservée à la vidéo, même si ce site web n'est, dans sa globalité, pas majoritairement composé de contenus audiovisuels. *A contrario*, d'ailleurs, si un site web comporte une offre essentiellement audiovisuelle mais comporte une section autonome composée d'autres contenus (par exemple des images fixes et/ou du contenu rédactionnel), cette section pourra être isolée du reste du site et de son éventuelle qualification de SMA.

Deuxième possibilité, les contenus audiovisuels ne peuvent être isolés sous forme d'un catalogue cohérent et susceptible d'avoir une existence autonome. L'on se trouve alors face à un service hybride dont les contenus sont à la fois audiovisuels et autres. Dans ce cas, il est nécessaire de déterminer quels sont les contenus principaux.

2° La détermination de l'objet principal du service :

Face à un service au contenu hybride, un critère purement quantitatif ne peut, à lui seul, suffire pour déterminer quel contenu est « principal » par rapport à l'autre. En effet, il peut s'avérer artificiel de comparer des quantités de contenu audiovisuel avec des quantités de contenus autres (par exemple rédactionnels).

En réalité, aucun critère ne peut, à lui seul, permettre d'appréhender une notion aussi subjective que celle d'objet principal, qui devra continuer à être appréciée au cas par cas. Sans qu'aucun d'entre eux ne puisse être considéré comme décisif à lui seul, le Collège tiendra notamment compte des critères suivants :

- La proportion du contenu audiovisuel par rapport aux contenus autres, en volume. Toutefois, comme cette proportion est difficile à établir, il n'en sera tenu compte que lorsque la prééminence d'un contenu par rapport à un autre, en volume, sera particulièrement flagrante (très peu de contenus audiovisuels et énormément de contenus autres, et *vice-versa*).

- L'ergonomie du service. La manière dont certains contenus sont mis – ou pas – en valeur sera prise en compte. Par exemple, les contenus audiovisuels d'un service pourraient être considérés comme principaux si l'éditeur oriente la navigation de l'utilisateur plus spécifiquement vers ces contenus, les met en valeur sur la page d'accueil, leur consacre prioritairement des opérations promotionnelles internes et externes, etc. La mise en valeur des contenus audiovisuels peut parfois passer par le nom donné au service : ainsi, si un service

hybride est appelé « TV X » ou « radio Y », ceci pourra constituer un indice de son caractère principalement audiovisuel.

- La finalité du service, son modèle économique ou « core business ». Il s'agit là de déterminer si la finalité du service est, avant tout, de communiquer au public des contenus audiovisuels ou des contenus autres. Pour répondre à cette question, le Collège aura davantage égard au profil du service qu'au profil de l'éditeur. Ainsi, si un éditeur s'est traditionnellement positionné comme actif dans un domaine non audiovisuel mais développe un service qui, lui, favorise les contenus audiovisuels, ce service pourra être qualifié de SMA. Pour déterminer le profil du service, le Collège tentera dès lors de déterminer quels contenus semblent principalement attirer le public sur le service et quels contenus ne sont qu'accessoires par rapport à d'autres.

  A cet égard, plusieurs considérants de la directive SMA excluent certains types de services de la notion de SMA parce que leurs contenus audiovisuels sont *généralement* accessoires. Il s'agit des versions électroniques des journaux et des magazines[29], des services dédiés aux jeux de hasard et jeux d'argent (mais pas les programmes qui y sont consacrés)[30] et des moteurs de recherche[31].

  Il faut toutefois remarquer que les considérants de la directive n'ont qu'une valeur indicative et ne peuvent pas primer sur son contenu, selon lequel un service ayant pour objet principal des contenus audiovisuels doit être qualifié de SMA. C'est dans cet esprit que devront être appréhendés tous les services en principe exclus par la directive. Ainsi, par exemple, face au site web d'un organe de presse, il conviendra d'examiner s'il s'agit bien d'une simple « version électronique » d'un journal papier ou si le site Internet constitue un nouveau service, certes issu du journal papier mais agrémenté de tellement de contenus audiovisuels qu'ils en deviennent prépondérants[32]. Dans ce dernier cas, le site web pourra constituer un SMA.

  Le Collège se réserve donc toujours la possibilité d'une appréciation au cas par cas.

* * *

En application des principes cités plus haut, un service hybride aux contenus à la fois audiovisuels (majoritairement) et autres (accessoirement) pourra donc être qualifié de SMA. Il convient quoi qu'il en soit d'insister sur le fait que le caractère hybride d'un service n'a pas pour effet de restreindre la responsabilité éditoriale de son éditeur. Ce dernier reste responsable de tous les contenus proposés sous sa responsabilité[33].

[29] Considérant 28 de la directive.
[30] Considérant 22 de la directive.
[31] Considérant 22 de la directive.
[32] A cet égard, une décision du régulateur britannique, l'Ofcom, relève ce qui suit : *« (...) Recital 28 means no more than this : a service whose principal purpose is the provision of the electronic version of a newspaper, an ancillary part of which is the provision of some audiovisual material, is not an ODPS. It is important to note that Recital 28 is not a blanket exclusion of any material linked to a newspaper or magazine, or which appears on websites belonging to their publishers. The AVMS Directive distinguishes between types of services. It contains nothing to distinguish between levels of regulation depending on the identity of service providers. »* (Ofcom, 21 décembre 2011, http://stakeholders.ofcom.org.uk/binaries/enforcement/vod-services/sunvideo.pdf)
[33] Y compris pour les contenus dont il aurait volontairement délégué l'organisation et la sélection à un sous-traitant.

2.4. Critère de la « communication au public »

a) Notion de communication au public

Pour être un SMA, un service doit être communiqué au public.

En vertu des travaux préparatoires du décret, ceci exclut de la notion de SMA *« toute forme de communication privée »*[34].

La directive précise, quant à elle, que la définition du SMA devrait couvrir exclusivement les services *« qui sont des médias de masse, c'est-à-dire qui sont destinés à être reçus par une part importante de la population et qui sont susceptibles d'avoir sur elle un impact manifeste »*[35] et *« exclure toute forme de correspondance privée, comme les messages électroniques envoyés à un nombre limité de destinataires »*[36].

b) Explication du critère et exemples

Le SMA se distingue des autres modes de télécommunication en ce qu'il est destiné, dans le chef de celui qui l'émet, au public en général ou à une partie de celui-ci, et n'a donc aucun caractère de confidentialité. Ce qui importe n'est pas le nombre d'utilisateurs réels du service mais le nombre d'utilisateurs potentiels. Comme en matière de droits d'auteur, la notion de communication au public doit donc s'apprécier en ayant égard à l'intention de l'éditeur et non à celle du public[37].

Le fait qu'un service ne soit, concrètement, utilisé que par un nombre très peu élevé de personnes n'a donc pas d'influence sur sa qualification de SMA. En revanche, il se peut qu'un média ayant un public très limité ne réponde pas à un *autre* élément constitutif du SMA, à savoir le fait de constituer un service économique. Si l'éditeur d'un média le destine au public en général mais ne fait rien pour se faire connaître et ne touche concrètement qu'un nombre très restreint de personnes, le Collège pourra considérer qu'il ne présente pas d'ambition d'entrer en concurrence avec d'autres services et qu'il n'a donc pas de vocation économique. Si un média destiné à tout un chacun remplit le critère de la communication au public, il n'en est donc pas pour autant nécessairement un SMA.

Pour déterminer si l'intention de l'éditeur est bien de destiner son service au public en général, le Collège aura notamment égard à un critère proposé par le Comité de contact institué par la directive SMA et qui consiste à se demander si l'éditeur destine son service à des personnes individuellement identifiables[38]. Un service sera considéré comme destiné à des personnes non individuellement identifiables et donc au public en général lorsque, tant par son *mode de diffusion* que par son *contenu*, il sera susceptible de s'adresser à tout un chacun.

Ainsi, par exemple, seront considérés comme destinés au public en général les services suivants :

- les services accessibles moyennant un code/décodeur que tout un chacun peut obtenir moyennant inscription et/ou paiement ;
- les services accessibles uniquement dans une zone territorialement limitée mais accessibles, dans cette zone, à tout un chacun (par exemple les télévisions locales) ;

[34] *Doc. Parl.*, PCF, 2008-2009, n° 634/1, p. 8.
[35] Considérant 21 de la directive.
[36] Considérant 22 de la directive.
[37] C. Const., 14 juillet 2004, n° 132/2004, B.10.1 et B.10.2.
[38] Minutes of the 27th meeting of the contact committee established by the Television without frontiers Directive - 16 april 2008 (Doc CC TVSF (2008) 4).
(http://ec.europa.eu/avpolicy/docs/reg/tvwf/contact_comm/27_minutes_en.pdf)

- les services diffusés dans des zones accessibles au public[39] et dont les contenus ciblent le public en général et pas uniquement les personnes fréquentant la zone concernée (par exemple des services qui sont diffusés dans des lieux fréquentés par le public, tels les gares, les commerces, etc. et dont le contenu n'est pas spécifiquement ciblé sur les usagers du train, les clients du commerce, etc.).

2.5. Critère des « programmes télévisuels ou sonores »

a) Notion de programmes télévisuels et sonores

Pour être un SMA, le service doit être composé de programmes télévisuels ou sonores.

Le décret définit le programme comme *« un ensemble d'images animées, combinées ou non à du son, lorsqu'il s'agit d'un programme télévisuel, ou un ensemble de sons lorsqu'il s'agit d'un programme sonore, constituant un seul élément dans le cadre d'une grille ou d'un catalogue établi par un éditeur de services »*[40].

La nature des programmes diffusés permet de qualifier le SMA de service télévisuel ou de service sonore.

Bien qu'il ne comporte pas de réels programmes, le télétexte est assimilé à un SMA par le décret, mais il n'est soumis qu'à un nombre limité de dispositions reprises dans la définition du SMA[41].

b) Explication du critère et exemples

Contrairement à la directive – qui n'englobe dans la notion de SMA que les services diffusant des programmes télévisuels – le décret y englobe également les programmes sonores.

Les explications données dans la directive sur ce qui doit être considéré comme un programme télévisuel peuvent néanmoins être transposées *mutatis mutandis* aux programmes sonores.

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[39] Par zone accessible au public, il faut entendre tout lieu, qu'il relève du domaine public ou d'une propriété privée, dont l'accès n'est pas limité à la sphère familiale. A titre indicatif, l'on peut se référer à la définition du lieu accessible au public donnée par l'article 2, 3° de la loi du 22 décembre 2009 instaurant une réglementation générale relative à l'interdiction de fumer dans les lieux fermés accessibles au public et à la protection des travailleurs contre la fumée du tabac. Cette disposition définit le lieu accessible au public dans les termes suivants :

a) « lieu dont l'accès n'est pas limité à la sphère familiale;
b) notamment les établissements ou bâtiments suivants :
i.lieux administratifs;
ii. gares;
iii. aéroports;
iv. commerces;
v. lieux dans lesquels des services sont fournis au public à titre gratuit ou moyennant paiement, y compris les lieux dans lesquels des aliments et/ou des boissons sont offerts à la consommation;
vi. lieux dans lesquels des malades ou des personnes âgées sont accueillis ou soignés;
vii. lieux dans lesquels des soins de santé préventifs ou curatifs sont prodigués;
viii. lieux dans lesquels des enfants ou des jeunes en âge scolaire sont accueillis, logés ou soignés;
ix. lieux dans lesquels un enseignement et/ou des formations professionnelles sont dispensés;
x. lieux dans lesquels des représentations sont données;
xi. lieux dans lesquels des expositions sont organisées;
xii. lieux dans lesquels des activités sportives sont exercées; »

La liste visée au b) n'est donc pas exhaustive. On rajoutera également à cette énumération tous les lieux accessibles au public et qui ne sont pas des lieux fermés, notamment la voirie, les parcs, etc.

[40] Article 1er, 36° du décret.

[41] Article 1er, 48° du décret.

La directive définit le programme comme « *un ensemble d'images animées, combinées ou non à du son, constituant un seul élément dans le cadre d'une grille ou d'un catalogue établi par un fournisseur de services de médias et dont la forme et le contenu sont comparables à ceux de la radiodiffusion télévisuelle. Un programme est, à titre d'exemple, un film long métrage, une manifestation sportive, une comédie de situation, un documentaire, un programme pour enfants ou une fiction originale* »[42].

Les travaux préparatoires du décret indiquent également qu'un programme doit avoir une forme et un contenu comparables à ceux de la radiodiffusion télévisuelle classique[43].

Pour être considéré comme un SMA, un service doit donc diffuser des programmes télévisuels ou sonores *comparables* à ceux diffusés par les services télévisuels et sonores « classiques ». Ces programmes doivent s'adresser au même public et être susceptibles d'entrer en concurrence avec ceux des services classiques. La notion de programme doit donc s'interpréter de manière dynamique, en tenant compte de l'évolution de ces services classiques[44].

Vu la grande diversité des programmes diffusés aujourd'hui sur les services de télévision et de radio « classiques », le Collège entend apprécier la notion de programme de manière large.

Sur le fond, des contenus ne seront exclus de la notion de programmes que s'ils n'ont pas été conçus pour s'adresser au grand public. Ainsi, seront exclus les contenus produits à l'origine à des fins purement personnelles (par exemple une vidéo de vacances) ainsi que les contenus spécifiquement dédiés à un groupe limité de personnes (par exemple une vidéo de formation destinée aux travailleurs d'une entreprise, une radio dont les contenus promotionnels ne sont destinés qu'aux clients d'un magasin)[45].

Si le programme contient des images – c'est-à-dire des représentations visuelles animées combinées ou non à du son – il convient de le considérer comme télévisuel. La radio filmée, par exemple, est considérée comme un programme télévisuel devant respecter les règles décrétales particulières propres aux services télévisuels.

La qualification de service télévisuel ou sonore est utile dans la mesure où, comme cela a été exposé dans l'introduction, le décret prévoit des règles particulières propres aux services télévisuels et des règles particulières propres aux services sonores privés.

2.6. Critère de la transmission « par des réseaux de communication électroniques »

a) Notion de réseau de communication électronique

Pour être un SMA, un service doit être diffusé par des réseaux de communication électroniques.

Le décret définit le réseau de communications électroniques comme « *les systèmes de transmission et, le cas échéant, les équipements de commutation ou de routage et les autres ressources, qui permettent l'acheminement de signaux par câble, par voie hertzienne, par moyen optique ou par d'autres moyens électromagnétiques, dans la mesure où ils sont utilisés pour la transmission de signaux porteurs de services de médias audiovisuels* »[46].

[42] Article 1.1, b) de la directive.
[43] *Doc. Parl.*, P.C.F., 2008-2009, n° 634/1, p. 8.
[44] Considérant 24 de la directive.
[45] *Doc. Parl.*, P.C.F., 2008-2009, n° 634/1, p. 8.
[46] Article 1er, 44° du décret.

b) *Explication du critère et exemples*

En pratique, la notion de diffusion par des réseaux de communication électroniques couvre le câble, la voie hertzienne, les réseaux satellitaires, Internet et les réseaux mobiles.

Un service diffusé au cinéma ou qui fait l'objet d'une location de DVD n'est dès lors pas transmis par des réseaux de communications électroniques et est exclu de la notion de SMA.

La question du mode de diffusion du service entraîne la question des médias multiplateformes, c'est-à-dire déclinés sur des plateformes différentes telles que la télévision linéaire sur plateforme fermée, la télévision non linéaire sur plateforme fermée (notamment les services de rattrapage en VOD des services linéaires), la webtv, les applications pour tablettes et smartphones, etc.

Lorsqu'un même éditeur diffuse des contenus similaires par ces différents modes de diffusion, est-on face à un seul ou à plusieurs SMA distincts ? Pour répondre à cette question, il convient de se poser successivement deux questions :

- Premièrement, les différentes déclinaisons du média sont elles ou non susceptibles d'être soumises aux mêmes règles ? Par exemple, si une déclinaison est linéaire et l'autre non linéaire, elles seront soumises à certaines règles différentes. Il en va de même si une déclinaison est diffusée sur plateforme ouverte et l'autre sur plateforme fermée. Dans ce cas, les déclinaisons doivent obligatoirement être considérées comme des SMA distincts puisqu'elles seront contrôlées différemment.
- Deuxièmement, si les différentes déclinaisons du média sont soumises aux mêmes règles, sont-elles fort différentes ? Si des déclinaisons d'un média présentent des profils trop différents l'un de l'autre, elles doivent également être contrôlées séparément. En revanche, si c'est essentiellement le mode de diffusion (par exemple via une application pour smartphone d'une part et pour tablette d'autre part) qui les distingue mais pas l'essence du service proposé, les deux déclinaisons pourront être considérées comme un service unique. Ceci s'appréciera au cas par cas, en fonction notamment de la proportion de contenus différents, du pourcentage de revenus distincts et du mode de commercialisation.

2.7. Critère de la finalité : « informer, divertir, éduquer ou assurer une communication commerciale »

a) *Notions d'informer, de divertir, d'éduquer et d'assurer une communication commerciale*

Pour être un SMA, un service doit avoir pour but d'informer, de divertir, d'éduquer ou d'assurer une communication commerciale.

Le décret définit la communication commerciale comme *« toute forme de message inséré dans un service de médias audiovisuels qui est conçu pour promouvoir ou vendre, directement ou indirectement, les marchandises, les services ou l'image d'une personne physique ou morale qui exerce une activité économique. Ces messages sont insérés dans un service de médias audiovisuels moyennant paiement ou autre contrepartie, ou à des fins d'autopromotion »*. Le décret prévoit que la communication commerciale comprend *« notamment la communication commerciale interactive, la communication commerciale par écran partagé, la publicité, la publicité virtuelle, le parrainage, le télé-achat, l'autopromotion et le placement de produit »*[47].

Les autres finalités que peut avoir un SMA ne sont pas légalement définies.

[47] Article 1er, 7° du décret.

b) <u>Explication du critère et exemples</u>

Les quatre finalités prévues dans la définition du SMA – et particulièrement les notions d'« informer », « divertir » et « éduquer » qui ne sont pas définies par le décret – sont très larges et recouvrent *a priori* l'essentiel de l'intérêt qu'un éditeur potentiel peut avoir à diffuser un programme télévisuel ou sonore.

Ces finalités ne sont, en outre, pas cumulatives.

Dès lors, les services ne remplissant pas le critère de la finalité sont relativement limités.

Fait à Bruxelles, le 29 mars 2012.

APPENDIX 3 : document of Medienrat CSA and VRM on media approach

Étude concernant l'utilisation des médias dans les données mobiles

Observations du CSA, du VRM et du MR quant à la méthodologie prévue

1. Point de départ de l'analyse : le concept de « services de médias audiovisuels et sonores »

Etant donné le contexte de l'étude, nous proposons de partir de la définition constitutionnelle des « services de médias audiovisuels et sonores » qui remplace, depuis 2014, celle de « radiodiffusion et télévision » au regard de la Loi spéciale de réformes institutionnelles du 8 août 1980). Cette définition résulte de la délimitation de la compétence des communautés en la matière opérée par la Cour constitutionnelle et a été avalisée par la sixième réforme de l'État.

Récapitulant les arrêts de la Cour constitutionnelle interprétant les articles 127, § 1er, de la Constitution et 4, 6°, de la Loi spéciale de réformes institutionnelles du 8 août 1980[1], les travaux préparatoires de la sixième réforme de l'État[2] donnent des services de « radiodiffusion et télévision » la définition suivante :

> *« des services, transmis via des réseaux de communications électroniques, qui fournissent des informations publiques, qui sont destinées, du point de vue de celui qui les diffuse, à l'ensemble du public ou à une partie de celui-ci et n'ont pas de caractère confidentiel, même si leur diffusion se fait sur demande individuelle et quelle que soit la technique utilisée pour celle-ci. Les services qui fournissent une information individualisée et caractérisée par une certaine forme de confidentialité, ne relèvent par contre pas de la radiodiffusion (Cour constitutionnelle, 14 juillet 2004, n° 132/2004, B.10.1-2 et 13 juillet 2005, n° 128/2005, B.7.1-2) ».*[3]

Si la sixième réforme de l'Etat entendait « adapter … l'intitulé de la compétence des communautés dans cette matière »[4], et l'a donc remplacé par celui de « services de médias

[1] Voy. aussi les articles 130, § 1er, de la Constitution et 4, § 1er, de la loi de réformes institutionnelles pour la communauté germanophone du 31 décembre 1983.
[2] Depuis lors, il n'y a pas eu d'arrêts de la Cour constitutionnelle qui auraient modifié cette définition.
[3] Proposition de loi spéciale relative à la Sixième Réforme de l'Etat, Commentaire des articles, *Doc. parl.*, Sénat, 2012-2013, 5-2232/1, p. 21.
[4] *Ibidem.*

audiovisuels et sonores », le contenu du concept antérieur est maintenu[5] et la compétence des Communautés à cet égard n'est par conséquent pas modifiée[6].

Partir de la définition constitutionnelle rappelée ci-dessus n'est pas seulement conforme aux principes juridiques fondamentaux de notre pays (et de son organisation institutionnelle). Cette approche permet aussi de respecter la « réalité de terrain », en ce que cette approche inclut dans l'analyse des activités et du trafic qui seraient sinon exclus.

Il s'agit donc d'une définition et d'une approche large[7]. Elle recouvre aussi des services et des activités qui relèvent du concept constitutionnel de « services de médias audiovisuels et sonores » au sens de la définition prérappelée mais ne sont pas inclus dans la définition européenne de « services de médias audiovisuels » visée à l'article 1er, paragraphe 1er, a), de la directive 2010/13/CE « Services de médias audiovisuels » telle que modifiée en 2018[8], notamment :
- les services de médias sonores, linéaires ou non ;
- les « services de plateformes de partage de vidéos », qui sont régis désormais par la directive 2010/13/CE révisée, mais de manière distincte des services de médias audiovisuels ;

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[5] *Ibidem.*

[6] Dans le contexte des discussions et des réponses de M. Verherstraeten, secrétaire d'État aux Réformes institutionnelles, le rapport fait au nom de la Commission des affaires institutionnelles par MM. Moureaux et Claes note qu'il n'y aura pas de refédéralisation en la matière et que « l'intention des auteurs de la présente proposition a toujours été de ne rien modifier à l'actuelle répartition des compétences en la matière » (Proposition de loi spéciale relative à la Sixième Réforme de l'Etat, Rapport fait au nom de la Commission des affaires institutionnelles, *Doc. parl.*, Sénat, 2013-2014, 5-2232/5, pp. 279 et 288-289).

[7] Als resultaat van de rechtspraak van het Grondwettelijk Hof is in het Vlaamse Mediadecreet de ruime notie van 'omroepactiviteiten' opgenomen (artikel 2, 25°, van het Mediadecreet). Deze categorie omvat *"elke activiteit die bestaat in het ter beschikking stellen van bewegende beelden, al dan niet met geluid, of van een reeks van klanken of geluiden aan het algemene publiek of een deel ervan via elektronische communicatienetwerken"*, en dit ongeacht de onderliggende technologie of het gebruikte platform en ongeacht het statuut van de aanbieder ervan (professionele omroeporganisatie, private persoon, culturele vereniging enzovoort). Deze categorie slaat ook op private initiatieven die niet economisch van aard zijn en bestrijkt bijgevolg het gehele Vlaamse bevoegdheidsdomein op het vlak van radio-omroep en televisie, in overeenstemming met de rechtspraak van het Grondwettelijk Hof.

Binnen de ruime categorie van omroepactiviteiten wordt de 'engere' notie van omroepdienst afgebakend. De definitie van het begrip omroepdienst (artikel 2, 26°, van het Mediadecreet) is gebaseerd op de definitie van audiovisuele mediadienst, als omschreven in de Richtlijn Audiovisuele Mediadiensten van 2010. Daar waar de definitie van 'audiovisuele mediadienst' enkel betrekking heeft op audiovisuele (televisie)diensten heeft de definitie van 'omroepdienst' betrekking op zowel audiovisuele als auditieve (radio)diensten". (zie o.m. *Parl.St.* Vl.Parl. 2006-2009, nr. 2014/1, p. 13).

[8] Directive 2010/13/UE du Parlement européen et du Conseil du 10 mars 2010 visant à la coordination de certaines dispositions législatives, réglementaires et administratives des États membres relatives à la fourniture de services de médias audiovisuels (directive « Services de médias audiovisuels ») (version codifiée), *J.O.U.E.* L 95/1, 15.4.2010, *err. J.O.U.E.* L 263/15, 6.10.2010, ELI: http://data.europa.eu/eli/dir/2010/13/2010-05-05, telle que modifiée par la Directive (UE) 2018/1808 du Parlement européen et du Conseil du 14 novembre 2018 modifiant la directive 2010/13/UE visant à la coordination de certaines dispositions législatives, réglementaires et administratives des États membres relatives à la fourniture de services de médias audiovisuels (directive « Services de médias audiovisuels »), *J.O.U.E.* L 303/69, 28.11.2018, ELI: http://data.europa.eu/eli/dir/2018/1808/oj, ELI du texte consolidé: http://data.europa.eu/eli/dir/2010/13/2018-12-18.

- les activités non économiques de radiodiffusion, qui ne constituent pas des services au sens des articles 56 et 57 du traité sur le fonctionnement de l'Union européenne, comme les activités de radio et de télévision en ligne non économiques en Communauté flamande.

Plus prosaïquement, on peut illustrer ce propos par les exemples concrets suivants :

Type de services	**Exemples**	**Compris dans la notion européenne de SMA (art. 1er, para. 1er, a), Directive SMA) ?**
Services de médias audiovisuels linéaires	RTBF La Une Eén VTM RTL-TVi BRF Fernsehen	Oui
Services de médias audiovisuels non linéaires (dits aussi « à la demande »)	Netflix Auvio vrt.nu m.brf.be (BRF Mediathek)	Oui
Services de médias sonores linéaires	Radio en ligne (services économiques et activités non économiques)	Non
Services de médias sonores non linéaires	Podcasts de stations de radio : www.rtbf.be/lapremiere/podcast https://radio1.be/tag/podcast https://1.brf.be/podcast/	Non
Activités de radiodiffusion non économiques	Particuliers qui téléversent et diffusent sporadiquement des vidéos via des plateformes en ligne, dans une logique de simple partage, au sein de communautés réduites, et sans poursuivre de réelle ambition éditoriale.	Non
Services qui transmettent uniquement des programmes courts ou des vidéos	Sections vidéo de certains sites web de journaux et magazines	Non, en tout cas en ce qui concerne les versions électroniques des journaux et des magazines[9]
Services de plate-forme de vidéo (proposant des programmes ou des vidéos générées par l'utilisateur (UGC))	Chaînes YouTube et YouTubers	Non (mais visés en tant que catégorie distincte par la Directive SMA révisée)
Sections vidéo des réseaux sociaux	Facebook Instagram TikTok Periscope Vimeo Snapchat Dailymotion	Non (mais visées en tant que catégorie distincte par la Directive SMA révisée)

Cette approche permet également de couvrir des activités qui ne sont pas nécessairement prises en compte par les registres des régulateurs des médias belges alors qu'elles relèvent bien de la

[9] Considérant 28 de la directive 2010/13/CE : « Le champ d'application de la présente directive devrait exclure les versions électroniques des journaux et des magazines. »

notion constitutionnelle de services de médias audiovisuels et sonores. Elles doivent donc être prises en compte quand on mesure le trafic "médias".

Ainsi, par exemple :

- renvoyant dans les définitions à la notion de « service » au sens des articles 56 et 57 TFUE, le décret des médias de la Communauté germanophone[10] vise les services audiovisuels et sonores de nature économique. Or, s'il existe des offres audiovisuelles et sonores en ligne de nature non économique, ces offres, bien que constituant des services de médias audiovisuels et sonores au sens du droit constitutionnel belge, ne sont pas pris en compte par le régulateur germanophone. Elles n'apparaissent donc pas dans ses bases de données.

- dans le décret flamand[11], ces activités non économiques (ainsi que les "services économiques de radiodiffusion") relèvent bien de la notion plus large d'"activités de radiodiffusion" (article 2, 25°). Pour ces activités, le décret ne prescrit aucune obligation de notification, mais uniquement les principes généraux de la liberté d'expression et l'interdiction d'incitation à la haine.

- le décret de la Communauté française[12] ne renvoie pas aux articles du TFUE précités, suggérant une interprétation extensive de la notion de service. Le CSA interprète le critère de l'activité économique comme ne devant pas forcément impliquer la recherche de bénéfices. Selon lui, ce critère recouvre la simple possibilité d'entrer en concurrence avec d'autres services de médias audiovisuels. Dès lors, des médias « non profits » sont intégrés à son registre sous la classification « WebTV ».

- s'il paraît assez sûr que les registres des régulateurs communautaires soient exhaustifs en ce qui concerne les services de médias audiovisuels distribués sur plateformes fermées, ce n'est pas le cas pour les services de médias audiovisuels sur plateforme ouverte, dans la mesure où ils sont parfois difficiles à identifier et à contacter lorsqu'ils ne se déclarent pas d'eux-mêmes auprès du régulateur concerné. Au surplus, il n'est pas interdit d'envisager l'assouplissement du régime déclaratif pour certains types de services de médias audiovisuels web natifs (par exemple les « vloggeurs », les services de médias audiovisuels distribués sur une plateforme de partage de vidéos,…). C'est d'ailleurs l'une des propositions du Collège d'avis du CSA dans son récent avis relatif à la transposition de la Directive SMA.

La portée du concept de services de médias audiovisuels et sonores tel que défini par la Cour constitutionnelle ainsi que ses éléments constitutifs s'adaptent constamment à la réalité changeante des marchés et des technologies.

[10] Dekret vom 27. Juni 2005 über die audiovisuellen Mediendienste und die Kinovorstellungen, *B.S.* 6. September 2005.
[11] Decreet van 27 maart 2009 betreffende radio-omroep en televisie, *B.S.* 30 april 2009 (Mediadecreet)
[12] Décret coordonné du 26 mars 2009 sur les services de médias audiovisuels, *M.B.* 24 juillet 2009.

2. Autres aspects méthodologiques

a) L'étude vise à identifier (de manière prospective) le trafic mobile des services de médias audiovisuels et sonores, d'une part, et des autres services, d'autre part, en Belgique, quelle que soit leur origine géographique ou le lieu d'établissement de leur hébergeur. Il faut prendre en compte la totalité du trafic, y compris celui qui correspond à l'utilisation, par des résidents belges, de services qui trouvent leur origine ou sont prestés dans un pays hors Union européenne ou Conseil de l'Europe. L'étude ne peut donc pas se limiter à la prise en compte des bases de données belges et européennes.

b) Si, pour les besoins de l'étude, on se limite aux services de médias audiovisuels et sonores et autres services transitant par les réseaux mobiles, il faut cependant extrapoler le trafic actuel sur les réseaux. En effet, il est à prévoir qu'avec les nouvelles possibilités offertes par la technologie 5G, le trafic de services de médias audiovisuels et sonores au sens belge s'accroisse très fortement. Ceci sera notamment dû aux « services de plateformes de partage de vidéos ». Il est essentiel de mettre l'accent sur une approche prospective.

Appendix 4: Media presence in YouTube trending videos

Date	Total Belgian Unlicensed Media	Total Belgian Licensed Media	Total EU registered Media (excl. BE)	Total non-registered int'l media	Total Media
27/11/2019	0,71%	0,05%	1,09%	11,70%	13,56%
28/11/2019	0,68%	0,05%	2,95%	12,81%	16,49%
29/11/2019	0,67%	0,06%	3,06%	12,15%	15,94%
30/11/2019	0,74%	0,06%	3,01%	10,92%	14,73%
1/12/2019	0,47%	0,00%	0,28%	6,41%	7,15%
2/12/2019	0,50%	0,06%	0,62%	6,92%	8,10%
3/12/2019	0,73%	0,09%	1,27%	10,30%	12,40%
4/12/2019	0,68%	0,09%	1,02%	11,90%	13,69%
5/12/2019	0,69%	0,07%	0,63%	11,88%	13,27%
6/12/2019	0,10%	0,06%	1,58%	10,47%	12,21%
7/12/2019	N/A				
8/12/2019	N/A				
9/12/2019	0,12%	0,09%	1,01%	4,33%	5,55%
10/12/2019	0,11%	0,10%	1,48%	4,05%	5,74%
11/12/2019	0,13%	0,06%	2,04%	5,13%	7,37%
12/12/2019	0,12%	0,08%	2,22%	6,74%	9,16%
13/12/2019	0,11%	0,10%	2,34%	6,77%	9,33%
14/12/2019	N/A				
15/12/2019	0,05%	0,17%	1,18%	7,96%	9,37%
16/12/2019	0,11%	0,14%	1,15%	7,12%	8,51%
17/12/2019	0,17%	0,13%	2,75%	4,98%	8,03%
18/12/2019	0,15%	0,14%	2,51%	4,09%	6,89%