

2024 EDITION

# The State of the Internet in France

Review and Perspectives  
on Arcep's Activities

ACTIVITY  
REPORT

VOLUME 3

# Editorial

## SAFEGUARDING AN OPEN INTERNET: THE FIGHT CONTINUES



**By Laure  
de La Raudière,**  
*Chairwoman of Arcep*

Why have I been so committed to Net neutrality, for so long and unwaveringly? It's a question I ask myself every time the debate is rekindled, as some players think they can eradicate it in places where it exists, and others seek to impose it, as demonstrated by the Federal Communications Commission's recent decision in the United States. The reason is simple: it is crucial to uphold Net neutrality for what it is, and what it can do.

Thanks to the principle of an open internet, enshrined in the European regulation adopted in 2015, we have the guarantee that all content<sup>1</sup> can circulate freely on electronic communications operators' networks, without discrimination. Fortunately, there is no such thing as VIP content! What it then enables is vital for

our democracies to function: first, it is the guarantee of the freedom to communicate, to exchange and share the content of one's choice and, second, it protects the freedom to innovate and develop new digital services without fear of possible restrictions on their route to end users.

Given how important it is to safeguard an open internet, Net neutrality alone is not enough. Back in 2018, Arcep was calling attention to the fact that, in addition to networks, other elements constituted bottlenecks to the free flow of information, content and applications: devices (smartphones, tablets, voice assistants) were identified as the "weak links" in achieving that openness. Then, in 2019 and 2020, we completed that analysis by shedding light on

the role and questionable behaviour of certain large online platforms, seeking to restrict users' freedom of choice and innovation. In both instances, Arcep acted as a catalyst in proposing to establish and entrench the principle of an open internet at the European level.

Adopted in 2022, Europe's Digital Markets Act<sup>2</sup> (DMA) tackles some of these issues: it imposes new rules on Big Tech, notably Apple, Google, Meta (Facebook) and Amazon, to create a more level playing field in digital markets. Their voluntary application of the Commission's regulation is a pledge to gradually open their ecosystems; Arcep is heavily involved in implementing this regulation via BEREC and the DMA High-level group. To give an example: Arcep helped verify the quality of Meta's reference offer for the interoperability of its WhatsApp instant messaging app, a bridge

that will enable other instant messaging apps to offer their users the ability to communicate with WhatsApp users.

Safeguarding the principles of an open internet is now facing a new challenge: generative AIs. By becoming new gateways between users and content, new information mediators, they could become the points of entry to our internet access. They could even replace traditional search engines. We therefore need to continue to work together, to challenge ourselves, to create new fora for dialogue, and devise ways to ensure that the internet remains an open space, a space of freedom, emancipation and innovation.

All of these issues are explored in this new edition of our annual report on the state of the internet in France. We hope you enjoy it.

1 Provided it is legal

2 Regulation 2022-1925 of 14 September 2022 on fair and contestable digital sector markets

# Introduction

## THE STATE OF THE INTERNET: GUARANTEEING THAT THE INTERNET CONTINUES TO DEVELOP AS A “COMMON GOOD”

**Arcep is responsible for monitoring the state of the internet in those areas that fall under its purview: the transition to IPv6, Net neutrality, quality of service, safeguarding an open and sustainable digital ecosystem. To provide an account of its actions and shed light on certain emerging issues, the Authority has been publishing an annual report on the state of the internet in France since 2017.**

According to the latest [Digital Barometer](#), 9 out of 10 people in France are internet users, which means that it plays a central role in society. Web browsing has become crucial to a wide range of daily tasks and activities. Which is why it is essential that everyone work together to ensure that this “network of networks” remains a desirable destination for users, a purveyor of opportunities, a space that respects users rights and acts as a catalyst for freedom.

The widespread use of the internet gives rise to a host of technical, legal, economic and societal issues. Its access, quality and accessibility determine how available the internet truly is to the largest possible number of users. The core principle behind a neutral and open internet is to prevent restrictions on certain services and content, which would limit users’ choices and favour incumbent players, at the expense of innovation. After the adoption of the EU Open Internet regulation of 2015, new regulations – on digital gatekeepers (Digital Markets Act) and more recently the Digital Governance Act and Data Act – have been introduced to protect this founding principle. As to the goal of meeting societal expectations to reduce digital technologies’ environmental footprint, ecodesign is one of the levers that can help reconcile ongoing innovation and sustainability. Artificial intelligence (AI) is another area that will have a decisive influence on the internet’s future.

With all of this in mind, Arcep wants to fully play its part in building an open, accessible, sustainable and safe internet. Which is why it works to ensure that it continues to develop as a common good.

This report on the state of the internet in France is volume 3 of Arcep’s annual report. It provides a summary of the work that the Authority has done over the previous year in a number of

areas: data interconnection, the transition to IPv6, Net neutrality, ecodesign, quality of service and the regulation of data and gatekeeper platforms.

This year’s report includes a chapter dedicated to generative AI’s impact on the internet and its openness. This type of AI raises multiple questions, and represents an unprecedented type of interface for accessing online content, and even becoming a new “gateway” to the Net. Researcher, Frédéric Alexandre, Professor Célia Zolynski and Secretary-General of CNUM, Jean Cattani, share their views in this chapter on the challenges that these technologies pose.

On the matter of sustainability, this edition includes contributions from stakeholders applying the General policy framework for the ecodesign of digital services, published on 17 May 2024: Christophe Clouzeau, a leading expert on ecodesign, and Mellie la Roque, in charge of SNCF Connect & Tech’s digital sustainability strategy.

Arcep’s work on ensuring nationwide coverage is addressed in volume 2 of the annual report: [“Regulation in support of connected territories”](#).

Other major issues surrounding the state of the internet: sovereignty, cybersecurity, digital inclusion, privacy... do not fall directly within Arcep’s purview, and are not addressed in detail in the annual report.

Finally, the report has evolved and continues to evolve year after year, to factor in changing ecosystem dynamics and new requirements to ensure online users’ satisfaction.

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# Snapshot of the state of the internet in France

**KEY FACTS**

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**KEY FIGURES**

# Key facts

6 MARCH 2023



## ENVIRONMENT

Arcep and ADEME publish the third and final volume of their [study of digital technologies' impact on the environment in France](#). The study reveals that if nothing is done to curtail digital technologies' growing environmental impact, their carbon footprint in France could triple and their energy consumption double between 2020 and 2050.

APRIL 2023



## OPEN INTERNET

The European Commission publishes its [report on the implementation](#) of the Open Internet regulation of 2015. Aligned with BEREC's positions on the matter, the EC focuses on the existing framework's alignment with the original goals, nine years after its adoption in Member States.

JUNE 2023



## INTERCONNECTION

Arcep's collection of IP interconnection data marks its 10th year! Between the start of 2012 and 2022, inbound interconnection traffic to the main Internet service providers (ISP) increased 20 times, reaching 43.2 Tbit/s at the end of 2022 (+21.4% compared to 2021). These ISPs' installed capacities increased proportionately during that time, going from 5.4 Tbit/s at the start of 2012 to 108 Tbit/s at the end of 2022.

JUNE 2023



## DIGITAL AFFAIRS

To support the implementation of the EU's [Digital Markets Act](#), BEREC publishes a report analysing the goals, scope and conditions for applying interoperability obligations to instant messaging.

SEPTEMBER 2023



## DATA

The [Data Governance Act](#) comes into force, and helps bolster the availability of open data and facilitates data sharing between the different sectors, while also guaranteeing the trustworthiness of these transactions.



SEPTEMBER 2023

## INTERCONNECTION

BEREC launches its first data collection campaign on IP interconnection. The Body of European regulators draws on its members network to consolidate data on these technical-economic relationships that were collected from European operators. The results of this work have been published in a [report](#), which was put out for public consultation on June 6, 2024.

9 OCTOBER 2023



## ENVIRONMENT

Arcep and Arcom hold a public consultation on the [General policy framework for the ecodesign of digital services](#). The document – produced in collaboration with ADEME, DINUM (the Inter-ministerial Directorate in charge of the State's digital transformation), CNIL (the Internet freedoms and innovation watchdog) and Inria (the National Institute for Research in Digital Science and Technology) – sets forth all of the criteria that need to be taken into consideration to reduce a digital service's environmental footprint (websites, applications, videos, AI...). The [latest version](#) was published on May 17<sup>th</sup> of 2024.

26 OCTOBER 2023



## QoS

Arcep publishes the findings of the [24<sup>th</sup> edition of its annual QoS scorecard](#), assessing mobile operators' quality of service in Metropolitan France. This survey includes the progression of download speed indicators to be able to provide the most accurate reflection possible of the user experience.

7 DECEMBER 2023

**IPv6**

Arcep, IDATE and IPv6 Forum host a [workshop](#) at Arcep's offices on the development and progress of IPv6 in France. The workshop is attended by more than 90 people from a variety of backgrounds: experts, internet professionals and aficionados, to discuss advances, trends and challenges surrounding IPv6 adoption.

13 DECEMBER 2023

**DATA**

For the first time, Arcep attended a meeting of the EDIB (European Data Innovation Board), alongside CNIL, devoted to the application of the Data Governance Act.



15 JANUARY 2024

**ARTIFICIAL INTELLIGENCE**

Arcep Chair, Laure de La Raudière, speaks at a hearing of the *Etats Généraux de l'Information* (national public forum on information) Steering Committee. Among other things, the Authority explains that mainstream generative AI tools could become the new gateways to the internet and to online news and information, which could have repercussions on an Open Internet.

JANUARY 2024

**QOS**

For the first time, a QoS testing tool (Nperf) incorporates information obtained through the "Internet access ID Card" API into its publications, thanks to work performed in collaboration with telecoms operators.

15 FEBRUARY 2024

**DIGITAL AFFAIRS**

As part of instant messaging apps' interoperability obligation (DMA), BEREC provides the European Commission with its [opinion](#) on Meta's draft Reference Offer for WhatsApp.



MARS 2024

**ARTIFICIAL INTELLIGENCE**

Arcep sends its [response](#) to the European Commission's public consultation on generative AI. The Authority underscores the opportunities, the economic and competition issues surrounding generative AI, as well as its environmental impact, which has yet to be properly assessed, and the potential threats to an Open Internet.



13 MARCH 2024

**DIGITAL AFFAIRS**

The [draft BEREC report](#) on the large content and application providers (CAP), and their relations with telecoms operators is published for public consultation. It provides a general overview of the large CAPs' strategies and of the dynamics and the different types of relations that CAPs have with telecoms operators, drawing on multiple case studies.



21 MARCH 2024

**ENVIRONMENT**

Arcep publishes the [3<sup>rd</sup> edition](#) of its annual "Achieving digital sustainability" survey. For the first time, it includes an analysis of internet routers', Wi-Fi extenders' and set-top box power consumption. It has also been expanded to include data collected from data centre operators and device manufacturers.



# Key figures

## DIGITAL USES

(2023 figures, sources: *Digital Barometer; Observatory of electronic communications services*)



**9 out of 10** people in France used the internet in 2023, and more than 8 out of 10 use it on a daily basis.



Close to **30%** of the population owns a smart speaker.



**80%** of people ages 12 and up report using mobile apps to exchange messages.



Average monthly **mobile data traffic** per SIM card stood at **14.9 Gb** in Q4 2023 (+1.6 Gb in one year).



**2 out of 10** people have already used an AI tool.



The percentage of **people** who subscribe to at least one **video on-demand service** totalled **56%** in 2023.

## CONNECTIVITY AND SUBSCRIPTIONS

(2023 figures; sources: *5G rollout observatory; fixed broadband and ultra-broadband services observatory; quarterly electronic communications services observatory*)



At the end of 2023, there were **32.3 million internet subscriptions** in France, of which two-thirds were to a fibre plan (+ 9 points in one year).



5G rollouts continue: three years after launch between **8,794 and 18,607 5G cell sites** have been launched commercially, depending on the operator in Metropolitan France as of 31 December 2023.



At the end of 2023, **38 million locals** in France were eligible to subscribe to FttH, or +3.5 million YoY.



Of the **83 million SIM cards** in service, **14 million are active** on 5G networks, or 17% of all mobile cards at the end of 2023.

## INTERCONNECTION

(2023 figures; source: *Barometer of data interconnection*)



At the end of 2023, **inbound traffic** at IXPs in France is estimated at **46.5 Tbit/s**, or close to + 8% compared to 2022.



Estimated at close to **10,6 for 1**, the **asymmetry ratio** between inbound and outbound traffic continues to shrink.



**53%** of the country's four largest **ISP's traffic** comes from Netflix, Akamai, Facebook, Google, and Amazon (including the traffic from Twitch).



Internal CDNs are estimated to account for **20%** of the trafficking bound to the ISPs' clients at the end of 2023,

and around **11.4 Tb/s** loaded onto ISPs' networks.

## IPv6

(figures as of mid-2023; source: *Barometer of the transition to IPv6*)



Mid-2023, **81%** of fixed access customers and **66%** of mobile customers in the consumer market were IPv6-enabled and nearly all are expected to be by 2030.



Only **19%** of domain names for e-mail use IPv6, but this percentage has increased substantially since 2022, going from 8% to 19%.



Including businesses, **65%** of all internet users in France are IPv6-enabled.



France **ranks 3<sup>rd</sup>** (behind India and Malaysia) in the rate of IPv6 use (among the 100 countries with the most internet users).



**31%** of websites are IPv6 enabled.

## ENVIRONMENT

(2022 figures; source: *annual "Achieving digital sustainability" survey*):



The main telecom operators' greenhouse gas emissions **increased by 2%** in one year.



**95%** of routers' power consumption does not depend on internet traffic or how heavily they are employed by users.



**Fixed and mobile networks' energy consumption rose by 7%** YoY, due to double the increase in mobile networks' energy consumption (+14% in 2022 vs. +6% in 2021).



Only **4%** of mobile phones sold by operators are **refurbished devices**, versus 25% for other vendors.



Internet routers and set-top-box together consumed **3.3 TWh**, or three times more than fixed networks' energy use.



**Data centre operators' power consumption increased 15%** in one year.

## PART 1

# Supervising the condition of internet infrastructure

### CHAPTER 1

Monitoring data interconnection and the relationships between Internet service providers and content providers

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### CHAPTER 2

Accelerating the transition to IPV6

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### CHAPTER 3

Guaranteeing Net neutrality

## CHAPTER 1

# Monitoring data interconnection and the relationships between Internet service providers and content providers



## THE BOTTOM LINE

- Inbound traffic to the main ISPs in France is estimated at **46.5 Tbit/s at the end of 2023**, which marks a 7.6% increase YoY.
- Close to **53% of inbound traffic** for the top four Internet service providers comes from five companies: **Netflix, Akamai, Facebook, Google, and (including Twitch's traffic).**
- Across the EU, **BEREC is collecting data on the interconnection market for the first time**, an exercise that is vital to understanding relations between telecoms operators and content providers.

## 1. DATA NETWORK INTERCONNECTION, AT THE HEART OF ARCEP'S EFFORTS TO SAFEGUARD AN OPEN INTERNET

The internet is a network of networks, in other words networks that are interconnected in a way that enables information to take a multitude of possible paths. Interconnection refers to the technical-economic relationship established between different parties to connect to one another and exchange traffic. It takes the form of a physical link between networks, guarantees their global mesh and enables end users to communicate with one another.

Data network interconnections are at the heart of how the Internet, "network of networks", works. Thanks to these links, the internet's many players exchange traffic, thereby creating a global network to which end users connect via their Internet Service Provider (ISP). Meanwhile, ISPs, interconnect with content and application providers (CAP) and other players along the internet value chain, to relay content and ensure good quality of service for their subscribers: the more direct the links, the better the quality of service.

The internet can only run smoothly if these interconnections are sound. Problems in the negotiations between two interconnected parties may, for instance, result in a lesser quality of service or a disruption of the interconnection which, in turn, will make it partially or fully impossible for users to access, use or distribute the services and applications of their choice. Interconnection could also be used for the purpose of anti-competitive discrimination against the source, the recipient, destination or content of the information being relayed.

When an interconnection issue arises, Arcep can exercise the powers assigned to it by the legislature, whether through an *ex ante* regulatory decision, or a dispute settlement decision at the request of one of the parties.

To ensure ongoing monitoring of the market, Arcep has been collecting data on interconnection and data transport on a biannual basis since 2012. The aggregated findings of these data collection campaigns are published in the Barometer of data interconnection<sup>1</sup>. Key figures for the 2024 edition of this barometer, pertaining to 2023, are provided in this Chapter.

<sup>1</sup> The Barometer of data interconnection is updated annually on the [Arcep website](#)



## THE MAIN INTERNET PLAYERS INVOLVED IN DATA INTERCONNECTION

A range of major stakeholders interconnect within the internet ecosystem:

- **Content and application providers (CAP):** the owners of the content who rely on multiple intermediaries to relay their content to end users;
- **Web hosting companies:** the owners of the servers that host the content managed by third parties (CAPs or individuals);
- **Transit providers:** international network managers that act as intermediaries between CAPs and ISPs for relaying traffic;
- **Internet Exchange Point (IXP) operators:** third parties operating an exchange point that enables the different players to interconnect directly through that IXP, rather than going through one or several transit providers;
- **Content Delivery Network (CDN) operators:** the technical intermediaries specialised in delivering large volumes of traffic to multiple ISPs, in different geographical areas, using cache servers located near end users, to optimise routing while improving performances and reducing costs;
- **Internet Service Providers (ISPs):** network operators that are responsible for relaying traffic to end users.

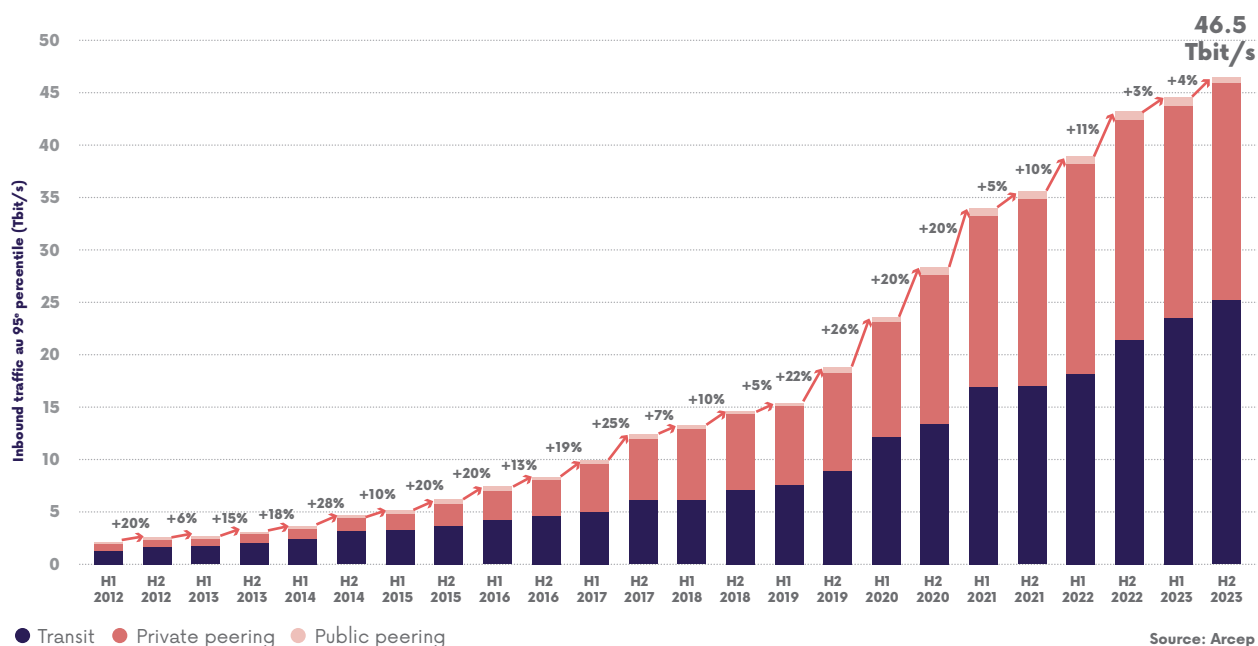
## 2. STATE OF INTERCONNECTION IN FRANCE IN 2023

Arcep therefore has technical and financial data on interconnection from the first half of 2012 to the second half of 2023. For confidentiality reasons, the published findings<sup>2</sup> are only the aggregated results from the four main electronic communications operators in France.

### 2.1. Inbound traffic

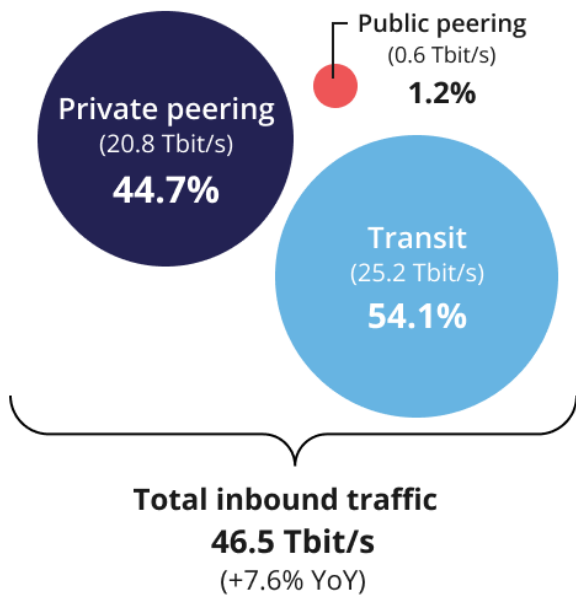
Inbound traffic to operators' networks continues to increase substantially, reaching a total **46.5 Tbit/s at the end of 2023**. This marks a 7.6% increase in one year. This is nevertheless a smaller increase than the estimated 21% growth observed between the end of 2021 and the end of 2022.

### PROGRESSION OF INBOUND TRAFFIC TO THE MAIN ISPS IN FRANCE, FROM H1-2012 TO H2-2023



<sup>2</sup> Results obtained from operators' responses to information gathering on the technical and financial conditions of data interconnection and routing, whose scope is detailed in Arcep Decision 2017-1492-RDPI.

**BREAKDOWN OF INBOUND TRAFFIC AT THE INTERCONNECTION POINT, ON THE NETWORKS OF THE MAIN ISPs\* IN FRANCE (END OF 2023)**



\* Bouygues, Free, Orange, SFR.

This deceleration of bandwidth consumption is consistent with the progression of mobile data traffic, which Arcep documented in its Observatory<sup>3</sup>. It can be attributed:

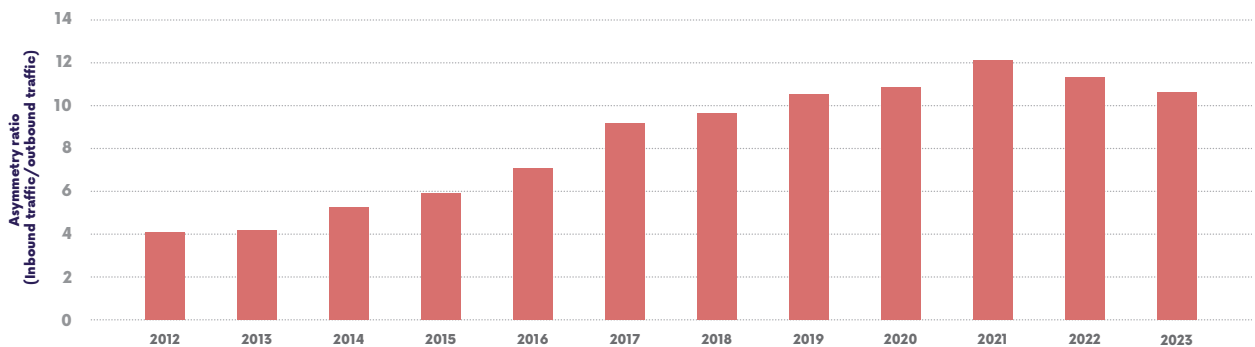
- First, to a change in demand: the 2023 Digital Barometer<sup>4</sup> also underscores the only slight increase in the percentage of people who subscribe to at least one video on demand (VoD) service (56%, +1 point in one year), after several years of steady increase;
- Second, to some content providers' efforts in terms of compression and traffic optimisation.

In the second half of 2023, inbound traffic on operators' networks is split chiefly between transit (around 54%) and private peering (around 45%), with a fraction being handled by public peering, i.e. at Internet Exchange Points or IXPs (around 1.2%). Transit accounts for the majority this year, whereas the division was more balanced in 2022: 48.5% private peering versus 49.5% transit (and 2% public peering).

**2.2. Asymmetry between outbound and inbound traffic**

The volume of outbound traffic continues to be smaller than the volume of inbound traffic, due to an asymmetry in how the internet is used: end users receive more data than they send. The asymmetry ratio between inbound and outbound traffic on the main ISPs' networks nevertheless continues to narrow year on year: in 2023, for 1 Gbit/s of outbound traffic there was 10.6 Gbit/s of inbound traffic, compared to a ratio of 1 to 11.3 in 2022. This change can be the result of the smaller increase in inbound traffic described above (inbound traffic increasing less) and to a possible increase in outbound traffic from the ISP's network.

**CHANGE IN THE ASYMMETRY RATIO BETWEEN INBOUND AND OUTBOUND TRAFFIC AT THE INTERCONNECTION LEVEL FOR THE MAIN ISPs IN FRANCE BETWEEN 2012 AND 2023**



Source: Arcep

<sup>3</sup> See the figures from Arcep's Observatory of electronic communications markets in France.

<sup>4</sup> Arcep, Arcom, CGE, ANCT, Digital Market Barometer 2023

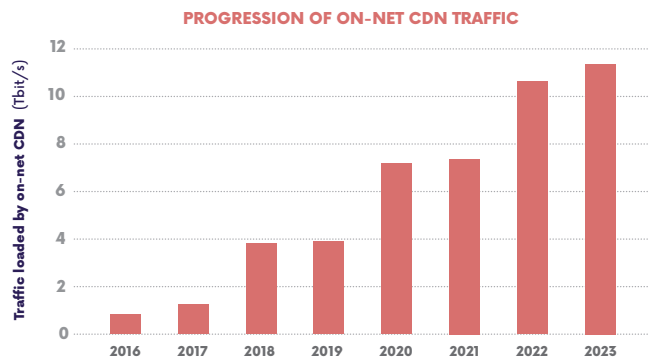
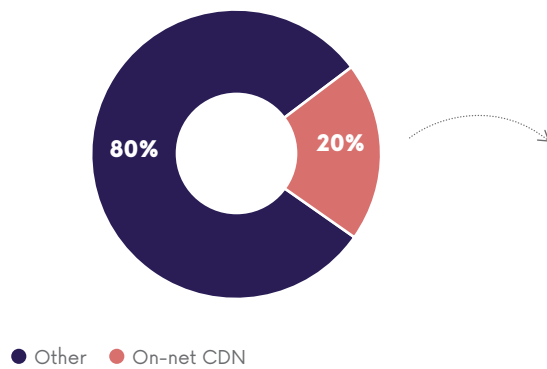
In addition to the above-mentioned analyses about the lesser increase in inbound traffic, several assumptions can be made to explain this outbound traffic dynamic, which was also noted by the firm Sandvine in its latest report<sup>5</sup>. The first would be advances in content distribution methods, which could rely more on outbound traffic using technologies akin to peer-to-peer. A second assumption would be the publication of videos on social media networks: end users may be uploading more videos to the Web, which would up outbound traffic from operators' networks.

### 2.3. The different interconnection methods

As internet usage became concentrated around the consumption of content, it became crucial to ensure that said content is relayed seamlessly. This led to the advent of a new interconnection method: on-net content delivery networks, or CDN (see inset), which the Authority has been observing since 2016. To better understand on-net CDN's role in relaying traffic to end users<sup>6</sup>, the following graph shows, first, an estimate of their share of traffic in the second half of 2023 and, second, the progression of traffic being loaded onto operators' networks by these content delivery networks.

**On-net CDNs continue to grow, with a volume of traffic they loaded onto operators' networks estimated at 11.37 Tbit/s by the end of 2023, versus 10.62 Tbit/s at the end of 2022.** Their traffic share is holding steady (20%, as it was last year).

## DISTRIBUTION OF TRAFFIC TO THE CUSTOMERS OF THE MAIN ISPS IN FRANCE BY INTERCONNECTION TYPE (END OF 2023)



Source: Arcep



### ON-NET CDN, A NOW WELL-ENTRENCHED INTERCONNECTION METHOD

CDN (Content Delivery Networks) are systems that create the ability to optimise the transmission of content to end users, thanks to a network of cache servers for storing content temporarily, located close to users where demand exists. This approach helps to reduce latency (content is loaded more rapidly) and to balance the load (requests are distributed between the different cache servers) when demand is high.

A distinction needs to be made between **third-party CDN** and **on-net CDN**. The former are operated by specialised companies such as Cloudflare, Akamai and Lumen, that

have a network of cache servers deployed across the globe. They access ISPs' networks like any other network, via interconnection. On-net (i.e. internal) CDN, are cache servers hosted on the ISP own network (naturally, through an agreement with that ISP): they are therefore located in proximity to end users. This, for instance, is the system used by Netflix and Google<sup>1</sup>.

Arcep has been collecting data on on-net CDN since 2016, to be able to factor in this new type of interconnection. Between 2016 and 2023, on-net CDN traffic increased more than tenfold, going from 0.82 Tbit/s to 11.37 Tbit/s.

<sup>1</sup> Cf. Arcep, 2024, *Barometer of data interconnection*.

<sup>5</sup> Sandvine, 2024, *The Global Internet Phenomena report*.

<sup>6</sup> Factoring in the comments made in the inset, "What is the link between French users' digital habits and interconnection traffic?"



## WHAT IS THE LINK BETWEEN FRENCH USERS' DIGITAL HABITS AND INTERCONNECTION TRAFFIC?

Traffic measured by ISPs at the interconnection point is influenced by French users' **digital habits**, but is not an exact representation of it.

The **interconnection point** is the location where traffic is exchanged with ISPs' partners. It is not located on the end users' device. The traffic, which is measured upon its arrival into the ISP's network, does not enter solely to meet the needs of end users: a (relatively marginal) percentage of exchanged data can be relayed over an ISP's network to reach another destination, e.g. another ISP.

As an adjunct to the information obtained for the Barometer of data interconnection, Arcep collects and publishes other data that can help provide a more detailed understanding of how the internet is used, and particularly **mobile data consumption**, as part of the Observatory of Electronic Communications Markets in France. The annual Digital Barometer, which is produced in partnership with Arcom, CGE and ANCT, delivers a qualitative snapshot of digital device ownership and usage in France.

### 2.4. Traffic source

Based on data collected from operators, Arcep can estimate the proportion of traffic originating from certain content providers (FCA) and content delivery or hosting actors, particularly third-party CDNs, when they are identifiable, relative to the total volume observed at interconnection points. The graph on page 17 thus presents an **aggregation of traffic from the main ISPs distributed according to the partners with whom the operators are interconnected.**

In 2023, Netflix remains the actor with the highest traffic share, estimated at 15.3%. This share has notably decreased from 19.7% at the end of 2022. The percentage generated by Akamai – a CDN specializing in providing cache servers to third parties – has increased by just over 3 points compared to 2022, reaching 12.3% at the end of 2023. The significant growth in Akamai's share could be explained by the increasing demand for video content, which is often hosted on third-party CDNs for traffic optimization reasons. The shares of Google and Meta have respectively declined by 0.8 points and 1.3 points compared to the end of 2022, standing at 9.8% and 6.8% of incoming traffic at the end of 2023. Amazon's share has slightly decreased to 6.4% in 2023 from 7% at the end

of 2022. The share of Twitch – owned by Amazon – has dropped from 3% at the end of 2022 to 2.1% at the end of 2023. Beyond these five actors, it is worth noting the increase in the share of Bytedance, the parent company of TikTok, whose volume has doubled since 2021.

While this visualization of traffic from its origin gives an idea of its composition in France, only content actors **directly connected to the interconnection points of internet service providers** are represented. Some service providers, although heavily used by user devices, are not represented because their traffic is routed through intermediaries (CDNs, transit providers, etc.) to the ISPs' interconnection points. For example, audiovisual actors such as TF1, M6, France TV, or platforms like Disney Plus, route some or all of their traffic through CDNs or other technical intermediaries, which explains the low share of traffic attributed to these actors in this graph. Content actors represented in the graph may also route part of their traffic through technical intermediaries and thus be associated with a relatively smaller share of traffic compared to their actual usage at the user terminal level.

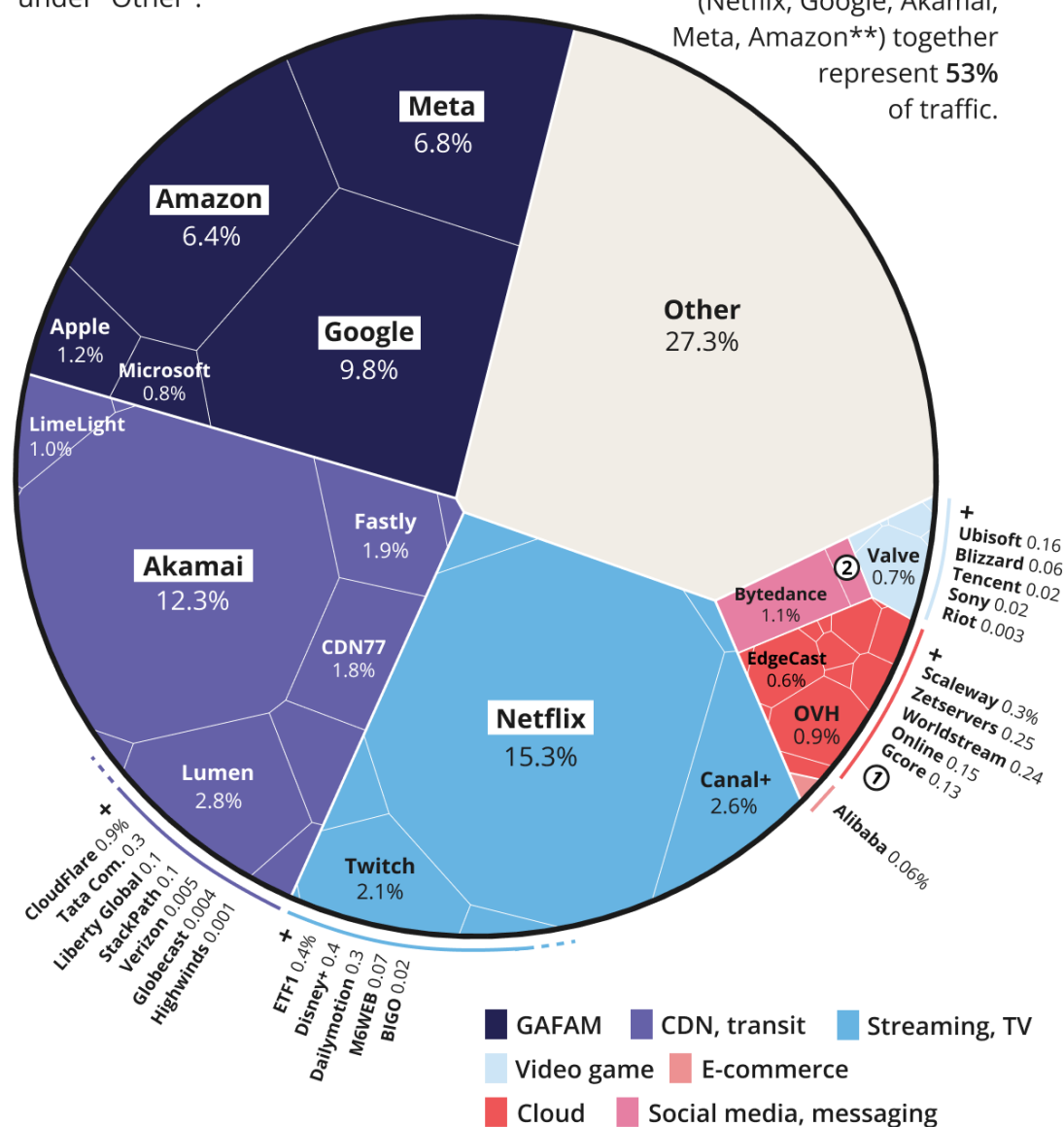


### BREAKDOWN BY ORIGIN OF TRAFFIC TO CUSTOMERS OF THE MAIN ISPS IN FRANCE (END OF 2023)

Percentage of inbound traffic at the interconnection point from 47 transport or content production companies, as reported by the main ISPs at the end of 2023. The remaining traffic is shown under "Other".

**Top 5 companies**

(Netflix, Google, Akamai, Meta, Amazon\*\*) together represent 53% of traffic.



Source : Arcep.

\* Bouygues, Free, Orange, SFR. \*\* 53% including Twitch, property of Amazon.

① M247 0.07% ; Dropbox 0.04 ; Dstorage 0.03 ; LeaseWeb 0.03 ; SdV Plurimédia 0.003 ; Mediactive 0.002.

② Telegram 0.2%.

### 3. STATE OF INTERCONNECTION IN EUROPE IN 2023

If Arcep has been collecting data on interconnection since 2012, it remained an exception in the EU up to 2023. Debates over the future of connectivity and network financing revealed the need to monitor the technical-economic relationships between internet players across the EU.

The Authority was able to lend its methodological expertise and experience to the creation of the data collection campaign that BEREC carried out across the EU, when preparing its report on interconnection practices. Through this exercise,

BEREC is elaborating a state of the art on European operators' interconnection practices (relationships between the different parties, monitoring of the different types of interconnections), as part of the mandate entrusted to it by EU Regulation 2015/2120. The purpose of this report is to identify new market trends to help complete BEREC's preliminary assessment, which will be published for consultation in June 2024.

The work performed by BEREC could provide additional insights with respect to the European Commission's proposals on IP interconnection, set forth in its recent White Paper<sup>7</sup> on the future of digital infrastructure. It mentions the possibility of giving European regulators additional competencies to monitor the interconnection market.



#### EUROPEAN WORK ON THE LARGE CONTENT AND APPLICATION PROVIDERS AND THEIR RELATIONSHIPS WITH TELECOM OPERATORS

In addition to IP interconnection, Arcep and BEREC have been actively working on the various technical and trade relationships between content and application providers (CAPs) and telecom operators, to fuel and enable informed discussions on the matter across the EU. Arcep is co-chairing BEREC's work on large content and application (CAP) providers' entry into the markets for electronic communications networks and services<sup>1</sup>.

The draft report, which was published for a public consultation that ran from 13 March to 26 April 2024, aims to identify the parts of the internet in which large CAPs are investing, and to analyse their strategies for moving up the value chain, their business models and their relationships with traditional ECN/ECS providers in terms of competition, cooperation and interdependence. The draft report thus provides an overview of the impact that large CAPs are having on electronic communications networks and certain services in Europe.

Relationships between large CAPs and electronic communications operators are multifaceted. Two kinds of players can form partnerships to provide joint or complementary services (e.g. operators provide broadband internet access

services, and CAP content and applications; set-top boxes deliver both internet access and access to Over-The-Top or voice assistant services). Operators and CAPs can also compete directly, notably when it comes to voice and messaging services, the supply of cloud services, content distribution networks (CDN), submarine cables, etc.

In its report, BEREC analyses these different dynamics through three case studies: on CDN, submarine cables and internet relay services that are akin to virtual private networks (VPN). The analysis reveals how large CAPs have deployed their own physical infrastructures (e.g. CDN, data centres etc.) and network infrastructure (e.g. submarine cables), and are now internalising a large portion of the services that they previously contracted from telecoms operators (e.g. international transit).

The reports also details some of the restrictions imposed by operating system providers that affect, or could affect, telecoms operators' ability to provide access to the internet or to certain services.

The final version of the report will be published by autumn 2024.

<sup>1</sup> BEREC, [Draft BEREC Report on the entry of large content and application providers into the markets for electronic communications networks and services](#), 2024.

<sup>7</sup> European Commission, 21 February 2024, White Paper – How to master Europe's digital infrastructure needs?

## CHAPTER 2

# Accelerating the transition to IPv6



## THE BOTTOM LINE

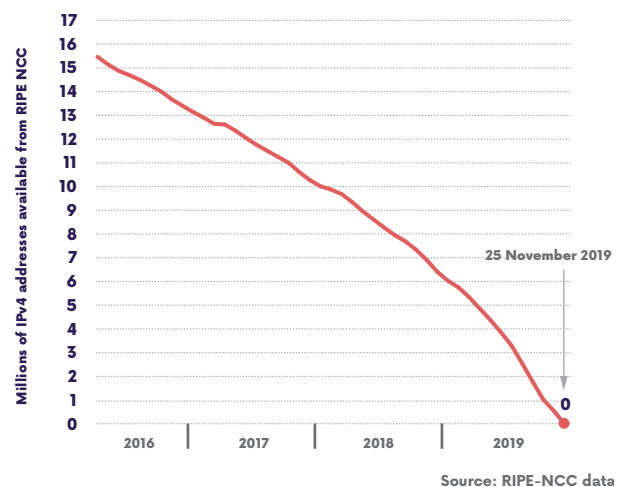
- The transition to IPv6 has become a pressing issue, to prevent the internet from being split into two: IPv4 on the one side and IPv6 on the other.
- As of mid-2023, **81% of residential fixed access customers** (FttH, cable, ADSL) were IPv6-enabled, **versus 66% of mobile network customers**. Arcep has nevertheless observed **sizeable disparities between operators**, particularly in terms of enabling IPv6 on business plans.
- Of the 100 countries with the most internet users, **France gets the bronze medal for IPv6 adoption**, with a combined residential and business adoption rate estimated at 64.6% in April 2024, behind India (71.2%) and Malaysia (65.5%).
- The **percentage of mail hosting companies' IPv6-enabled addresses has more than doubled in the past 12 months**, going from 8% to 19% between mid-2022 and mid-2023.
- Arcep hosts the **IPv6 task force** and in 2023 co-hosted a workshop on the development and advances in IPv6 in France. **Training videos** on the technical aspects of IPv6 were produced for the event.

## 1. ACCELERATING THE TRANSITION TO IPv6: KEY TO SAFEGUARDING COMPETITION AND INNOVATION

Every device connected to the internet has an IP address. Public IP addresses are registered and routable on the Web, and are therefore unique worldwide identifiers. IPv4, which has been used on the internet since 1 January 1983, provides an addressing scheme of close to 4.3 billion IP addresses. But the overwhelming success of the Web, the range of uses and the proliferation of connected objects have led directly to the **gradual exhaustion of IPv4 addresses**. Since 25 November 2019, RIPE NCC (the regional internet registry that allocates IPv4 addresses in Europe and the Middle East) has been suffering a shortage of IPv4 addresses.

To tackle this situation, IPv6 specifications were finalised in 1998. They incorporate functions for increasing security by default and optimising routing. Above all, IPv6 delivers an almost infinite number of IP addresses: 667 million IPv6 addresses for each square millimetre of the earth's surface.

## HISTORY OF IPv4 ADDRESS EXHAUSTION



This sluggish pace of IPv6 development creates a risk of seeing the Internet split in two, with IPv4 on one side and IPv6 on the other. To give an example, if a website or an application is hosted in IPv6-only, that means it cannot be accessed by users who only have an IPv4 address.

This shortage of IPv4 addresses, and the ensuing risks, make the transition to the new internet communication protocol an especially pressing issue.

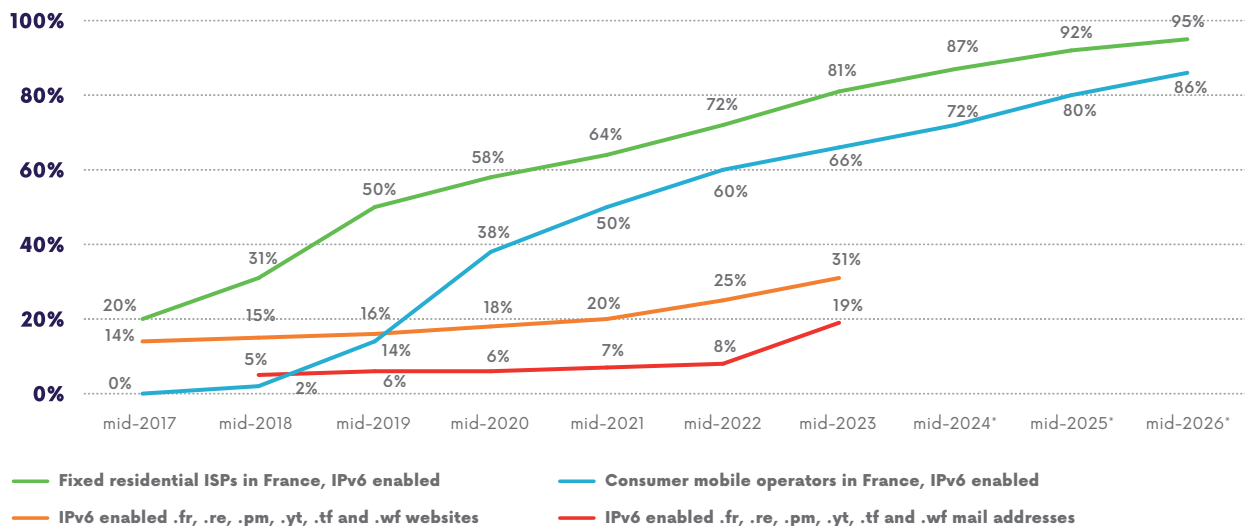
To assess IPv6 deployment in France, Arcep uses data collected in accordance with its [Decision No. 2023-0543](#) along with [data from Afnic](#) to produce an annual Barometer of the transition to IPv6, providing an overview of IPv6 adoption in France. This Chapter shares the main findings of the [2024 edition](#).

## 2. STATE OF THE TRANSITION TO IPv6 IN 2023

### 2.1. A plethora of players, all at different stages in their transition

Operators are making the transition to IPv6 more rapidly than web hosting companies and other content providers. As of mid-2023, 81% of residential Internet service providers' customers were IPv6-enabled, versus 66% of mobile customers. Looking at content providers and hosting companies, 31% of websites are IPv6-ready (19% for email addresses). If these figures are low, there has been a notable uptick in the pace of the transition: for mail, the rate of IPv6 readiness has more than doubled in the past 12 months. And almost all residential customers are expected to be IPv6-enabled by 2030<sup>1</sup>.

### STATUS OF THE TRANSITION TO IPv6 IN FRANCE



\*Figures subject to change (operator forecasts, except for Free mobile: Arcep forecasts)

Operator source: data from end of June 2023, collected by Arcep from the main operators and aggregated according to market share as of Q3 2022. For the sake of the analysis, the assumption is that Android has a 70% market share and iOS 30%. Website and mail source: Afnic data from October 2023

<sup>1</sup> On fixed networks, by 2026, customers that do not have access to IPv6 will be on networks at the end of their life (ADSL/VDSL/cable), but the copper network is due to be switched off by 2030. On mobile networks, with the exception of Free, it is mainly old devices that are not IPv6-enabled which should gradually be phased out of the fleet.

## 2.2. Fixed ISPs

According to forecasts provided by operators, **the transition to IPv6 amongst residential customers should be virtually complete in 2030** with the switchoff of the copper network: some operators have chosen not to migrate infrastructures that are coming to the end of their life to IPv6. The transition for internet plans designed for businesses and professionals could take a few years longer.

On **residential fixed networks**, Arcep notes significant disparities between the main French telecom operators' transition to IPv6:

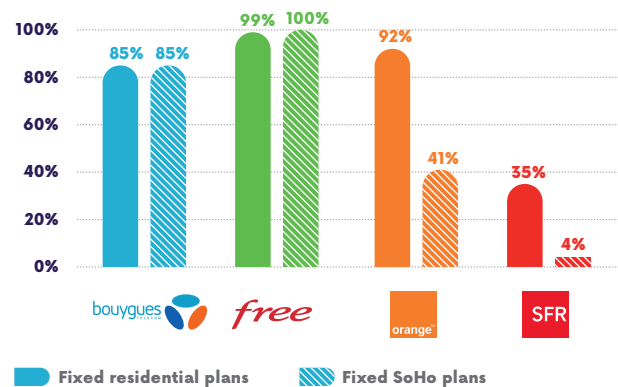
- **Bouygues Telecom** enables IPv6 for all of its residential FttH, ADSL, VDSL, 4G box and 5G box customers with a compatible router/STB and connected to its own network. IPv6 not yet available for ADSL or VDSL on a third-party backhaul network (it is Bouygues Telecom customers who are connected to an Orange DSLAM).
- **Free** enables IPv6 for all of its residential FttH, ADSL, VDSL customers connected to its own network. IPv6 not available for ADSL or VDSL on a third-party backhaul network (aka non "unbundled" customers) nor on Free's 4G+ box/router.
- **Orange** enables IPv6 for all of its residential FttH, ADSL, VDSL, 4G Home and 5G Home box customers with a compatible router/STB and connected to a network that assigns its DHCP addresses. IPv6 not available for some residential ADSL customers (addresses assigned via PPP). Added to which, all new customers' addresses are assigned by DHCP scope.
- **SFR** is phasing out the replacement of network equipment that was not IPv6-compatible on the FttH network. IPv6 is not systematically enabled: it is therefore left up to the customer to configure their router. At a time when the copper access is gradually being switched off, in 2023 SFR elected to eliminate

IPv6 support on ADSL/VDSL plans. IPv6 (encapsulated in IPv4) had previously been available with ADSL and VDSL plans, but not enabled by default (at the end of June 2022, 1% of ADSL and VDSL customers had enabled this option). IPv6 is also not available on the operator's cable network.

For **"Pro" plans** designed for small businesses (SoHos), operators emulate residential market strategies, with two exceptions:

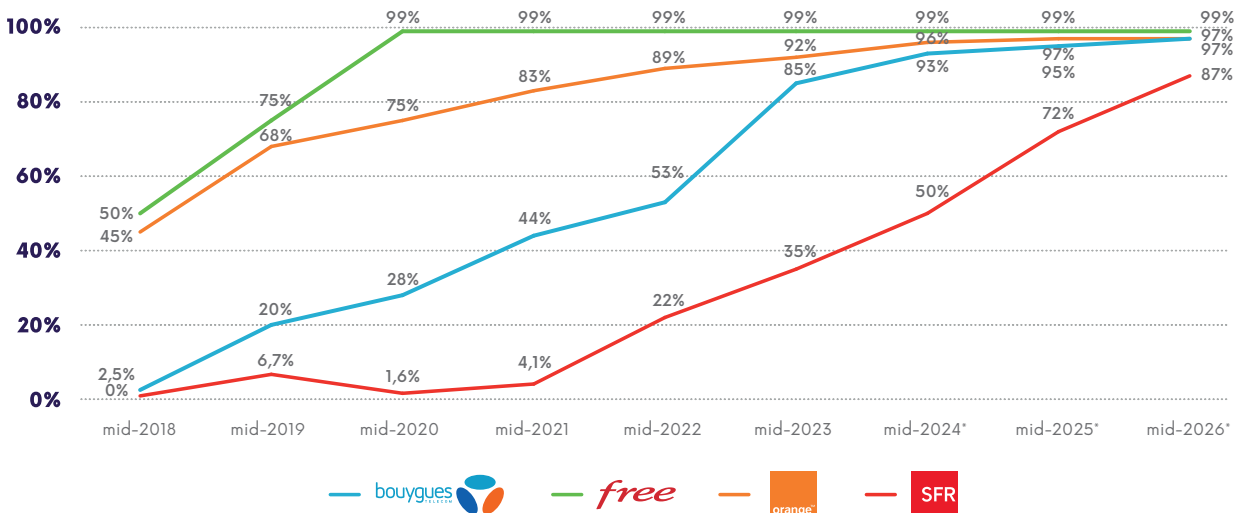
- **Orange:** IPv6 is not made available to ADSL or VDSL "Pro" small business customers;
- **SFR:** IPv6 is only available for fixed 4G and 5G plans (no IPv6 for FttH, ADSL, VDSL or cable plans for small businesses).

### FIXED NETWORKS: PERCENTAGE OF IPv6-ENABLED CUSTOMERS



Source: Data as of end of June 2023, collected by Arcep from operators

### RESIDENTIAL FIXED NETWORK: PROGRESSION OF IPv6-ENABLED CUSTOMERS



\*Figures subject to change

Source: Data as of end of June 2023, collected by Arcep from operators

### 2.3. Mobile ISPs

According to the forecasts provided by Bouygues Telecom, Orange and SFR, smartphones' transition to IPv6 (i.e. that are not IPv6-enabled by default) should be complete in 2030, for both consumer and business customers. The transition could take longer for "data only" plans (4G/5G portable routers, tablets, computers, etc...).

Free is not able to provide forecasts for upcoming IPv6 enablement rates.

Arcep has observed sizeable **disparities in consumer mobile plans'** transition to IPv6. If all of the main operators offer IPv6, there are real differences in their approach to enabling the protocol:

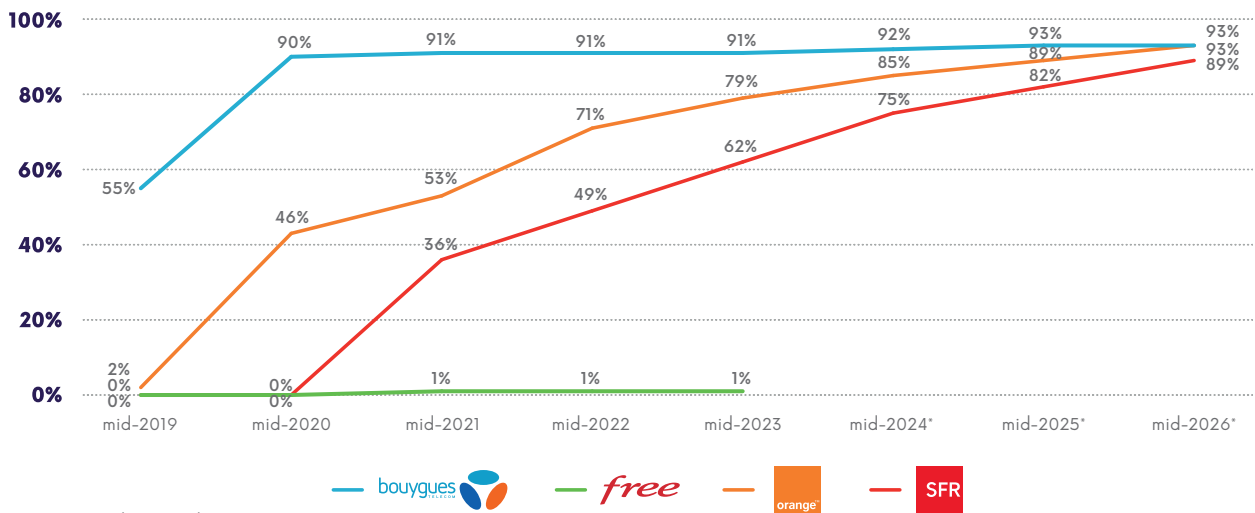
- **Android:** Bouygues Telecom, Orange and SFR all enable IPv6 by default on Android phones released after 2018 (Bouygues), 2020

(Orange) or 2021 (SFR). Free does not enable IPv6 by default. Customers need to enable IPv6 manually in their account space, then on their Android phone (unless they have a smartphone that was released after July 2022);

- **iPhone:** Bouygues Telecom, Orange and SFR all enable IPv6 by default on iPhones with at least iOS 12.2 (Bouygues), iOS 13.0 (Orange for iPhone 7 and more recent), iOS 14.3 (SFR), or iOS 15.4 (Orange for iPhone 6S and SE). Free does not enable IPv6 by default. Customers need to enable IPv6 manually in their account space, and to have downloaded at least iOS 15.4.

For "Pro" **small business plans, Bouygues Telecom, Orange and SFR** offer IPv6 under the same terms as consumer plans; **Free Pro** plans still do not offer IPv6.

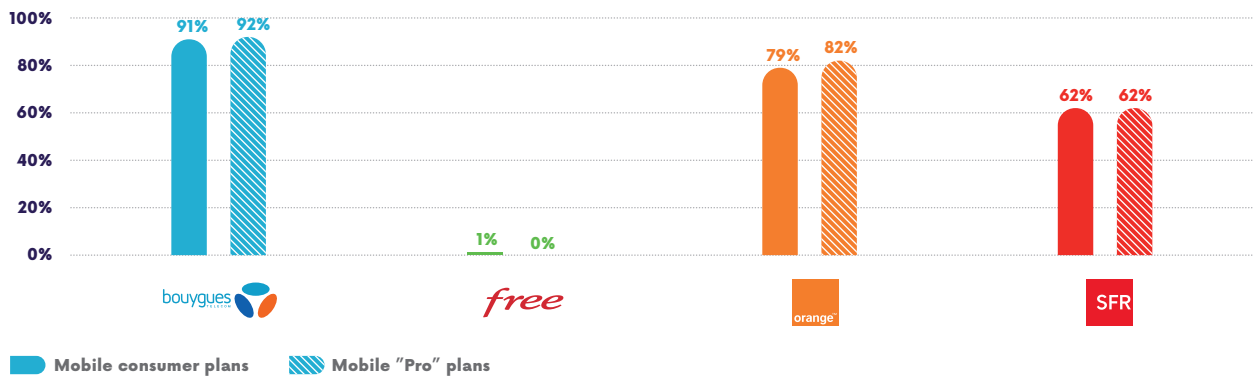
### CONSUMER MOBILE NETWORK: PERCENTAGE OF IPv6-ENABLED CUSTOMERS



\*Figures subject to change

Source: Data as of end of June 2023, collected by Arcep from operators and aggregated. The assumption is that Android has a 70% market share and iOS 30%.

### MOBILE NETWORK: PERCENTAGE OF IPv6-ENABLED CUSTOMERS



Source: Data as of end of June 2023, collected by Arcep from operators and aggregated. The assumption is that Android has a 70% market share and iOS 30%.

## 2.4. Web hosting companies

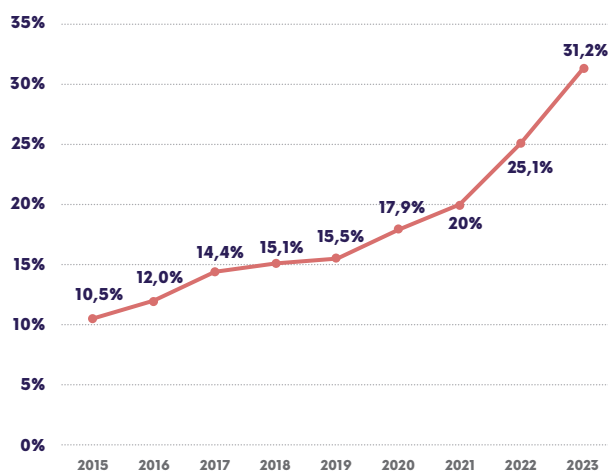
A website is considered accessible in IPv6 when it has a DNS IPv6 registration. To exclude a portion of the unused domain names, the rate is calculated using only domain names with an HTTPS certificate, i.e. 2.4 million of them with domain names ending in .fr, .re, .pm, .yt, .tf and .wf are analysed below.

In October 2023, web hosting companies were one of the weakest links in the migration to IPv6. **Only 31.2% of websites are in fact IPv6-ready.** It is nevertheless worth noting the steady rate of increase: up six points since October 2022 and 11 points since 2021. More domain names were IPv6-enabled over the past two years than between 2015 and 2021.

Among the top 10 web hosting companies in France, IONOS, LWS, Infomaniak and Cloudflare are reporting that more than half the websites they host are IPv6-enabled.

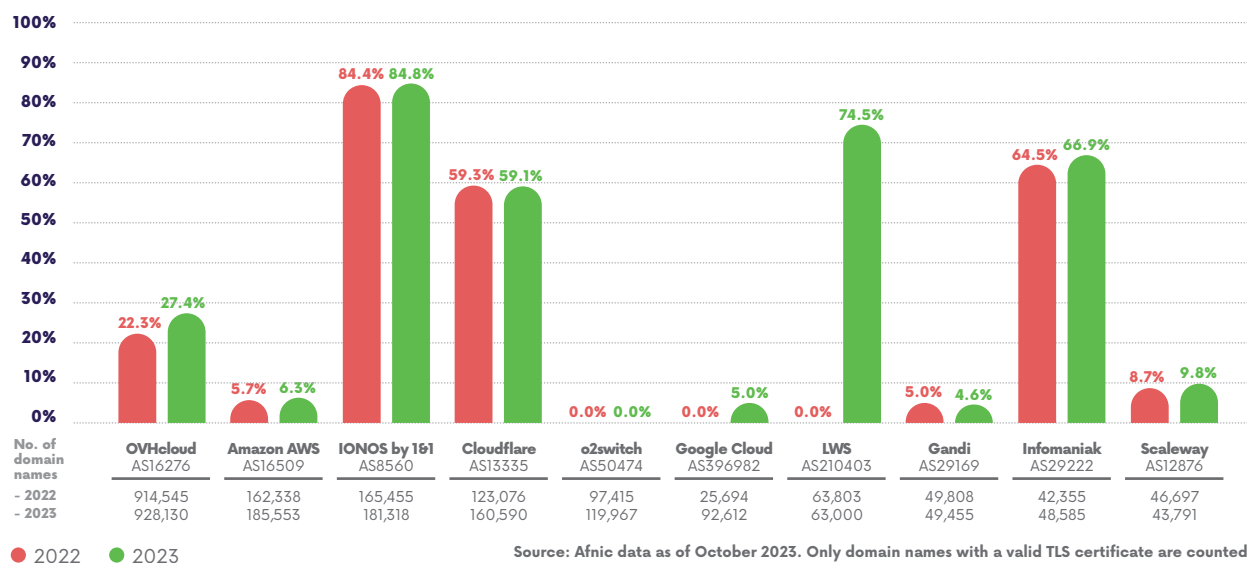
Data on all .fr, .re, .pm, .yt, .tf and .wf web hosting companies are available in three formats: PDF, OpenDocument (can be read with LibreOffice Calc or Excel) and CSV raw data.

### PROGRESSION OF IPv6-ENABLED WEBSITES for .fr, .re, .pm, .yt, .tf and .wf domain names



Source: Afnic data as of October 2023.

### TAUX DE SITES WEB ACCESSIBLES EN IPv6 sur les noms de domaine .fr, .re, .pm, .yt, .tf et .wf



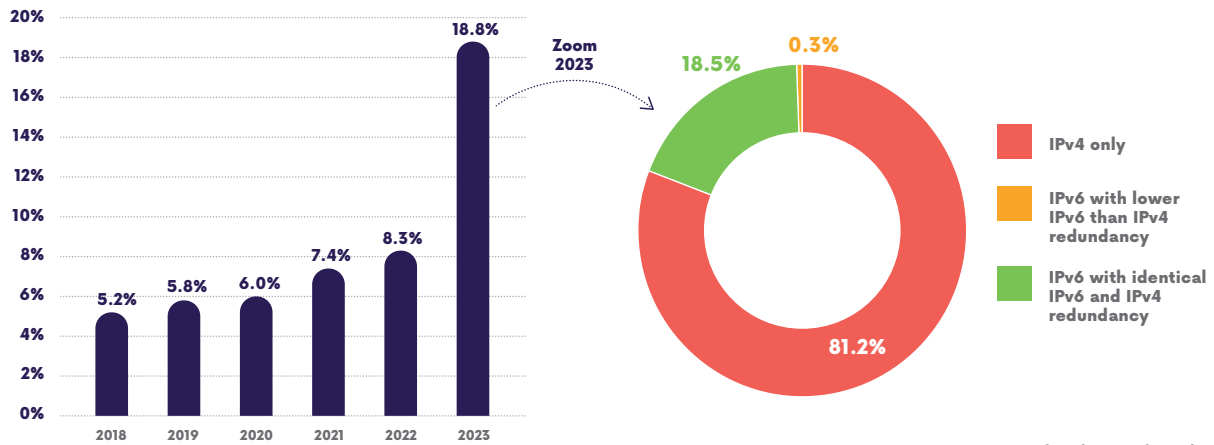
Source: Afnic data as of October 2023. Only domain names with a valid TLS certificate are counted.

## 2.5. Mail hosting companies

Mail hosting servers also lag very far behind in the transition: only 18.8% of mail servers currently use IPv6<sup>2</sup> addresses. There has nevertheless been a **considerable increase** since 2022: the number of IPv6-enabled mail servers has more than doubled in 12 months, from 8% to 19%. This percentage still remains very small, compared to the other links in the internet chain.

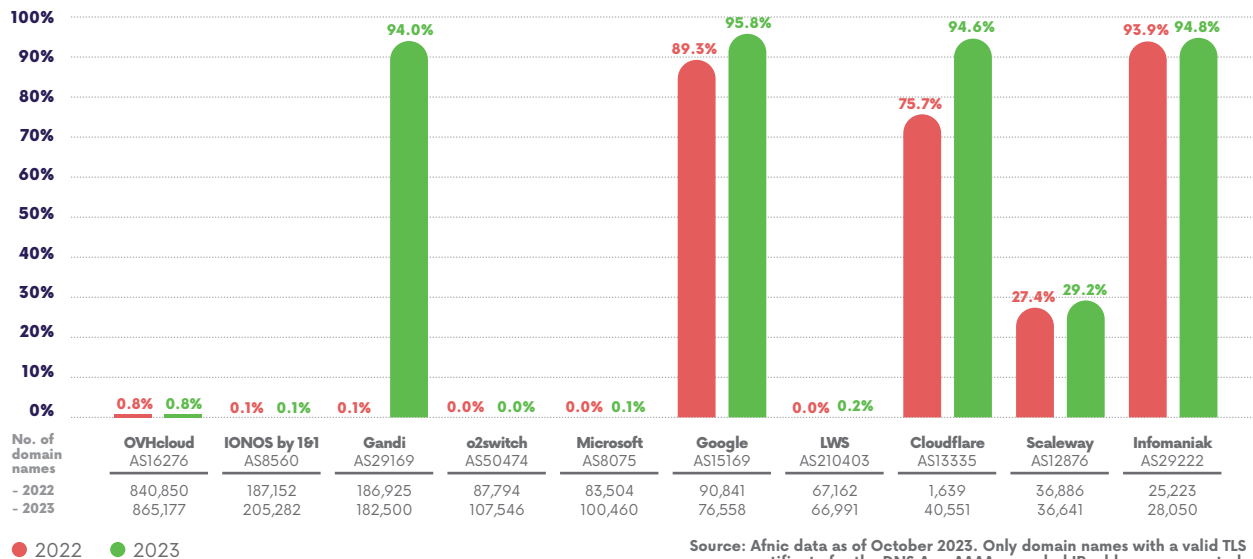
Looking at the top 10 players in terms of domain name numbers, Google, Infomaniak, Cloudflare and Gandi rank highest, each with more than 94% of domain names for mail using IPv6.

### PERCENTAGE OF WEB MAIL ACCESSIBLE IN IPv6 for .fr, .re, .pm, .yt, .tf and .wf domain names



Source: Afnic data as of October 2023

### PERCENTAGE OF IPv6-ENABLED MAIL SERVERS for .fr, .re, .pm, .yt, .tf and .wf domain names



Source: Afnic data as of October 2023. Only domain names with a valid TLS certificate for the DNS A or AAAA recorded IP address are counted.

2 To exclude a portion of the unused domain names, only the 2.1 million websites with domain names ending in .fr, .re, .pm, .yt, .tf and .wf that met the dual condition of valid HTTPS hosting and mail hosting were considered.

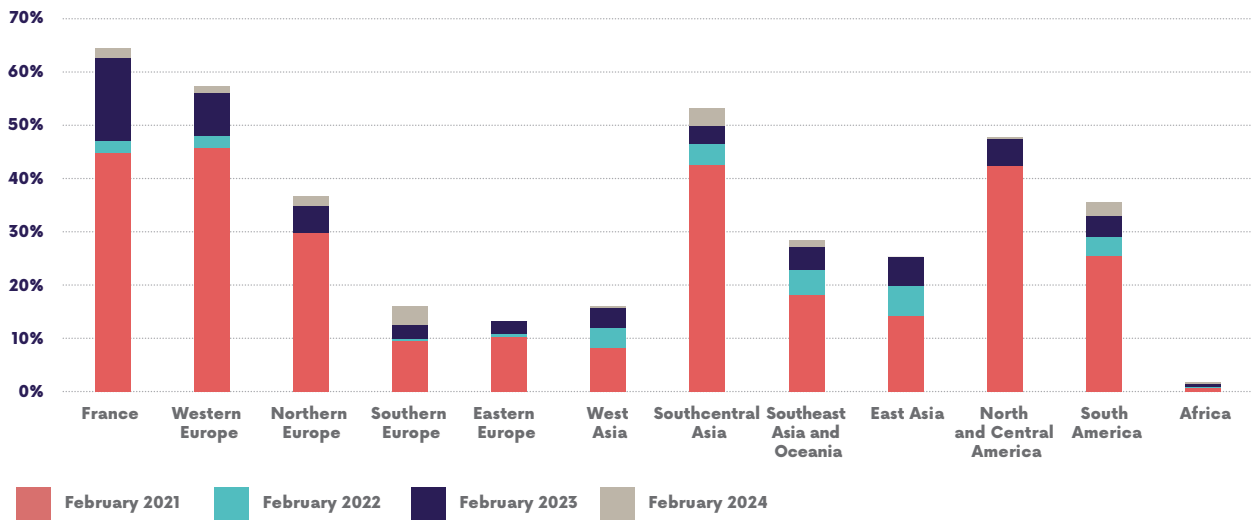


### 3. THE TRANSITION TO IPv6 AROUND THE WORLD

Arcep has created an interactive map that lets users both view the rate of IPv6 adoption in the 100 countries with the most internet users, and see how the rankings have changed over time. In April 2024 the IPv6 adoption rate represents the percentage of IPv6-enabled users, through their ISP's network, measured at the

hosting company (which is already IPv6-enabled) level. It therefore provides an idea of the status of devices' and internet service providers' (residential and business, fixed and mobile) transition. France ranks number three worldwide (64.6%), behind India (71.2%) and Malaysia (65.5%).

#### REGIONAL IPv6 ADOPTION RATE



Source: February 2024 IPv6 data from Google, Akamai, Facebook and Apnic. Only the 100 countries with the most internet users are considered. The median of the four sources is calculated for each country, before being aggregated, prorated by the number of internet users in each region.



#### THE VIEW FROM ABROAD: THE CZECH REPUBLIC'S INITIATIVE TO SHUT DOWN IPv4 IN 2032:

The Czech Government asked the public sector to stop providing e-government services using IPv4 as of 6 June 2032. Internet users who are not IPv6-ready in 2032 will no longer have access to Czech government websites,

and business applications are going to follow suit and shut down IPv4 at the same time. A countdown has been created [online](#).



## WORK BEING DONE BY THE IPv6 TASK FORCE

Since 2019, Arcep has been heading up the IPv6 task force, in collaboration with Internet Society France. Open to all internet ecosystem players (telcos, hosting companies, businesses, public sector, etc.), this task force meets once a year, and is geared to bolstering the transition to IPv6 by giving participants an opportunity to discuss specific issues and to share best practices.

To contribute to the effort to achieve “Widespread awareness of IPv6” mentioned in the [Government report on the status of IPv6 deployment in France](#) of June 2016, the task force released four short videos, produced by the École Polytechnique, IMT Atlantique and Jean-Charles Bisecco, expert member from the IPv6 task force:

- **IPv6 and Internet of Things:** 6LoWPAN, RPL, Matter, LPWAN and SCHC by IMT Atlantique (Laurent Toutain, Pascal Thubert, David Le Goff and Rémi Demerlé): [video](#).
- **SRv6** (*Segment Routing over IPv6 dataplane*): introduction to the protocol, by the Institut Polytechnique de Paris (Kevin Jiokeng and Thomas Clausen): [video](#).
- **SRv6** (*Segment Routing over IPv6 dataplane*): deployment strategy, by Jean-Charles Bisecco: presentation - [video](#).
- **BIERv6** (*Bit Index Explicit Replication IPv6 encapsulation*) by Institut Polytechnique de Paris (Kevin Jiokeng and Thomas Clausen): [video](#).

**On 7 December 2023, IDATE, Arcep and IPv6 Forum hosted a workshop** in Arcep’s offices on the development and advances in IPv6 in France. The workshop provided an opportunity for expert-led discussions. Arcep Executive

Board member, Serge Abiteboul, and IDATE President and CEO, Jean-Luc Lemmens, kicked off the workshop by underscoring the importance of the transition to IPv6: *“The goal is not to keep two protocols. The goal is to shut down IPv4 at some point. We’re not there yet, but we do have to prepare for it. We need to map out shutdown scenarios to know how we can manage, in a not too distant future, to shut down IPv4 completely”*. ([video](#)).

[Videos of the workshop can be viewed on the Arcep website](#). One of the most popular is of [Bouygues Telecom explaining solutions for sharing IPv4 between multiple customers](#).

This workshop will be held again in 2024.



↑ Photo of Serge Abiteboul, member of the Arcep Executive Board, delivering the opening remarks at the “IPv6 France” workshop on 7 December 2023.

## CHAPTER 3

# Guaranteeing Net neutrality



## THE BOTTOM LINE:

- Close to 10 years after its adoption, the **Open Internet regulation** continues to be a cornerstone in safeguarding end users' rights, and in supporting an open and innovative environment on the Net.
- In 2023, more **13,000 tests** were performed in France using the **Wehe** prioritisation detection app, made available by Arcep, bringing the total number of tests performed in France since the application launched to 680,000.
- Arcep oversees the application of Net neutrality and carries out forward-looking work to keep regulated stakeholders informed about the regulation's application as **technological developments** reshape the sector.

**Net neutrality** is a term that was coined in 2003 par Tim Wu, Professor of Law at Columbia University in New York<sup>1</sup>. It creates the ability to guarantee **equal treatment of all internet traffic**. **Net neutrality includes the guarantee of users' freedom to access and distribute information and content on line**, to use and create applications and services for users, as well as having the principle of non-discrimination apply to the traffic relayed across the networks that make up the internet. It therefore excludes, in particular, any positive or negative discrimination – be it technical or commercial – based on the source, destination or content of the information transmitted over the network.

## 1. NET NEUTRALITY REGULATORY FRAMEWORK

Established by the regulation laying down measures concerning Open Internet access<sup>2</sup>, the principle of Net neutrality and an Open Internet help safeguard the Web as a place of freedom of expression, of communication, of access to knowledge, of freedom to share and freedom to innovate. The regulation thus enshrines:

- users' right *"to access and distribute information and content, use and provide applications and services, and use terminal*

*equipment of their choice, irrespective of the end-user's or provider's location or the location, origin or destination of the information, content, application or service, via their Internet access service"*<sup>3</sup>.

- and Internet service providers' duty to *"all traffic equally, when providing Internet access services, without discrimination, restriction or interference, and irrespective of the sender and receiver, the content accessed or distributed, the applications or services used or provided, or the terminal equipment used"*.<sup>4</sup>

In October 2016, the Digital Republic Act (loi pour une République Numérique) designated Arcep as the Authority responsible for implementing the Open Internet Regulation in France.

In 2022, Arcep and its European counterparts updated the **guidelines for implementing the Open Internet Regulation**, as a follow-up to three rulings<sup>5</sup> handed down by the Court of Justice of the European Union (CJEU) in 2021 pertaining to zero-rating practices<sup>6</sup>. In these rulings, the Court of Justice stipulated that a zero-rating option creates a distinction, based on business considerations, between internet traffic by not deducting traffic to partner applications from customers' basic data plan allowance, which runs counter to Open Internet regulation obligations<sup>7</sup>.

1 Tim Wu, 2003. Broadband Discrimination, Journal of Telecommunications and High Technology Law, vol. 2. p. 141.

2 Regulation (EU) 2015/2120 of the European Parliament and Council of 25 November 2015 laying down measures concerning Open Internet access.

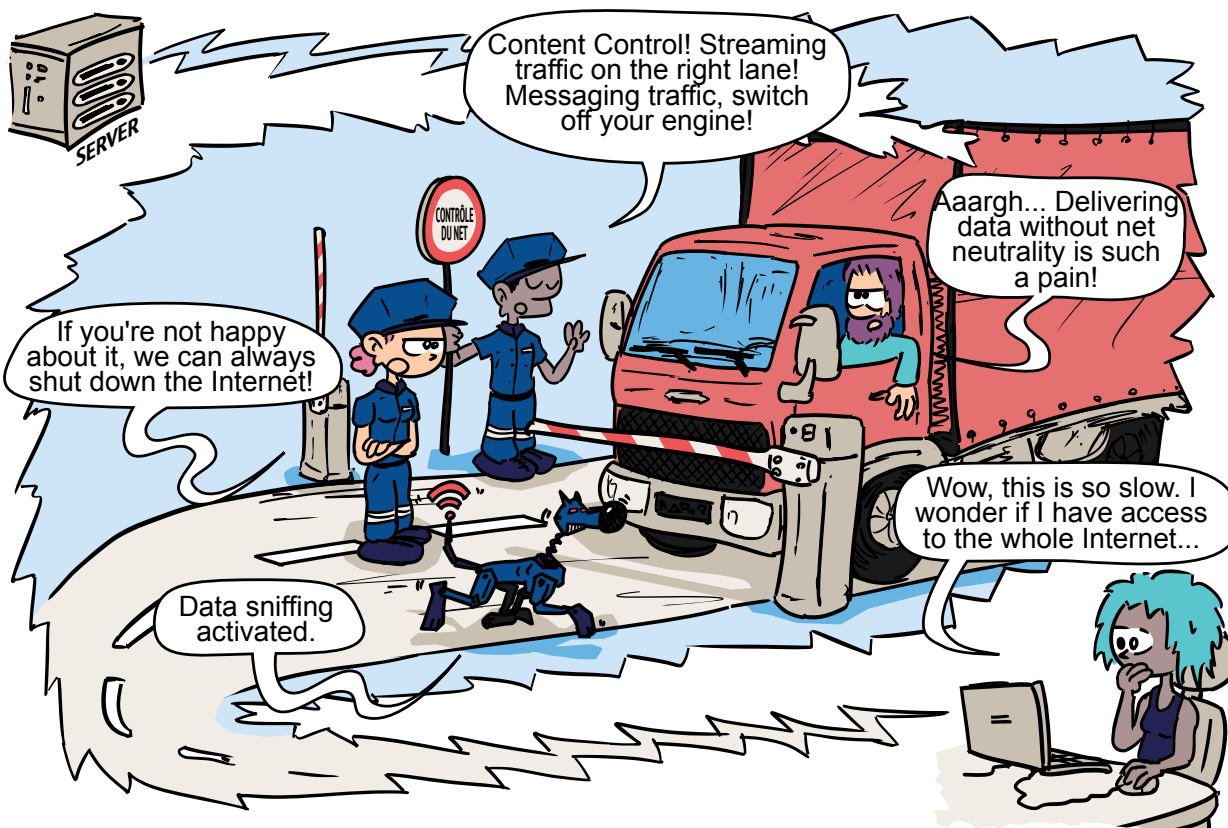
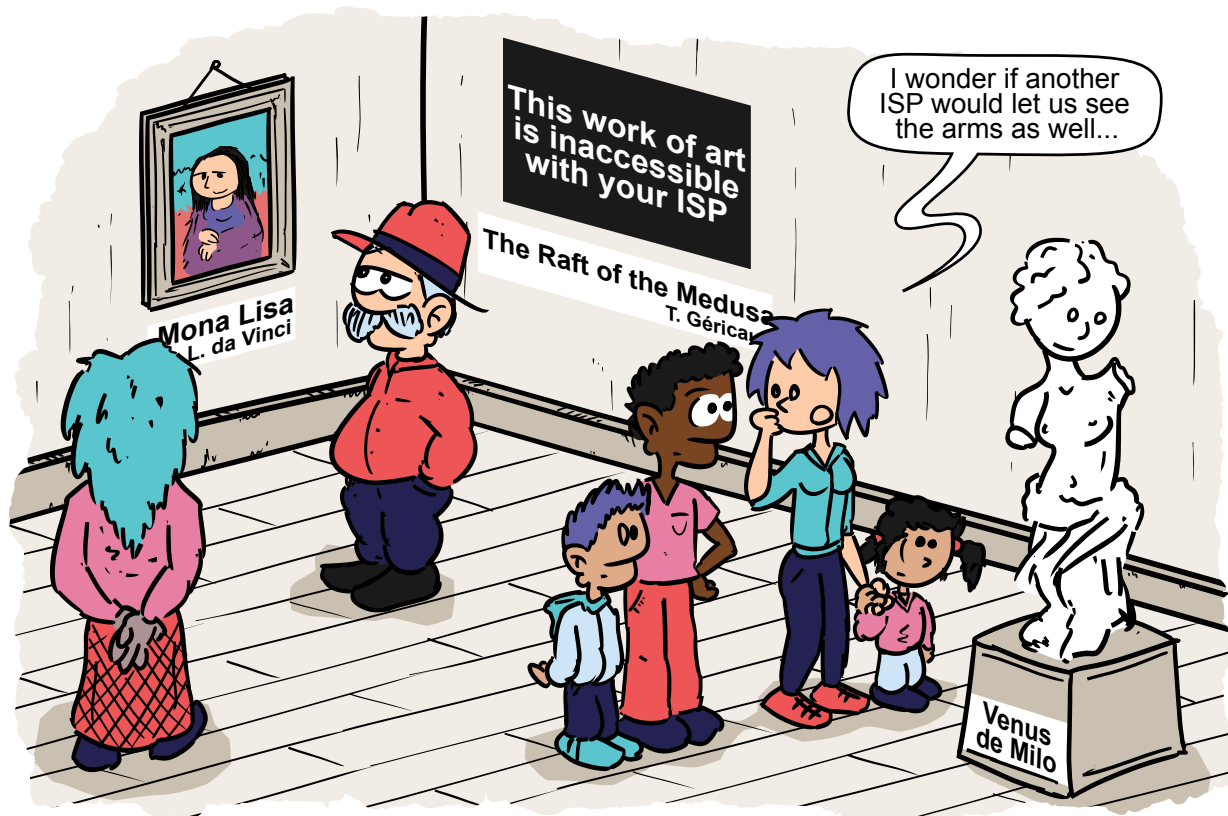
3 Article 3(1) of Open Internet Regulation No. 2015/2120

4 Article 3(3) of Open Internet Regulation No. 2015/2120

5 CJEU, 2 September 2021, Vodafone and Telekom Deutschland (cases C-854/19, C-5/20 and C-34/20)

6 Zero rating refers to practices whereby an ISP applies a zero-tariff or preferential pricing to all, or part of the data traffic generated by a specific category of application provided by one of the ISP's partners. This means that the traffic generated by the use of that service or application is not deducted from basic plan customers' data allowance. When offered as part of a plan with a set data allowance, this zero-rating option therefore allows ISPs' to bolster the appeal of their plans.

7 Court of Justice of the European Union Press release No. 145/21.



## 2. THE TOOLS AT ARCEP'S DISPOSAL TO CARRY OUT ITS MANDATE

To safeguard Net neutrality, Arcep has created a **toolkit** designed to enable the Authority to obtain a detailed overview of market practices with respect to the Open Internet regulation's four cornerstones: **business practices, traffic management, specialised services and transparency obligations**. Arcep departments therefore examine Internet service providers' (ISP) terms and conditions of use on an ongoing basis. As an adjunct to this monitoring work, Arcep has regulatory tools at its disposal that enable it to collect information from ISPs on their network management rules.

Arcep also relies on data-driven regulation to detect any Net neutrality violations. In particular, Arcep provides end users with access to the "J'alerte l'Arcep" reporting platform whose reports constitute an important element in Arcep's diagnostic capabilities. They enable the Authority to monitor issues that users are encountering in real time, and to identify recurring malfunctions or

spikes in user reports, to then better target its actions and thereby achieve more effective regulatory actions.

Since 2018, Arcep has also been providing consumers with a **detection tool** called Wehe, which is available for free, in French, on Android, iOS and F-Droid.

Arcep also wanted to provide users with a tool for detecting any potential blocking, throttling or priority queuing applied to a port, which could affect end users' ability to access online services. Some online services and applications are accessed through a specific port, so any blocking, throttling or prioritisation of that port could affect how end users' are able to access that service

Lastly, the Authority works regularly with industrial actors, academia and associations to set out rights and obligations in this area. Arcep has, for instance, worked with the Université Paris Dauphine-PSL for their Masters in Telecoms and media management programme, to assist with Net neutrality teaching and acculturation. Arcep departments lectured on the general regulatory framework that applies to the electronic communications sector, the issues surrounding net neutrality as well as the role assigned to Arcep of monitoring the application of Open Internet rules.

### ARCEP'S NET NEUTRALITY TOOLKIT



Source : Arcep



## WHAT IS WEHE, THE TOOL THAT DETECTS IMPEDIMENTS TO NET NEUTRALITY?

Developed in partnership with the **Northeastern University in Boston**, Wehe is a testing tool with an Open Source code that analyses the traffic generated by an application to determine whether an operator might be throttling or prioritising certain data traffic or ports.

From a technical standpoint, the port test compares https traffic for each of the ports selected by the user, and compares it to traffic on port 443, which has been defined as the baseline port. If there are significant disparities between different tests performed by Wehe, users are invited to relay any issues encountered directly through the “J’alerte l’Arcep” platform, so that the Authority can examine any potential incompatibility with the Open Internet

regulation, on a case by case basis. Updates to the Wehe app have included a review of the differentiation test, and a closer alignment with the most popular services in France. New test categories were also introduced to facilitate the selection of services tested by users and improve how the test results are displayed to users.

**In 2023, more than 13,000 tests were performed in France using the Wehe** prioritisation detection app, made available by Arcep, bringing the total number of tests performed in France since the application launched to 680,000.

All of the statistics on the tests performed in France are available online.

### DIFFERENT TRAFFIC REPLAYS TESTED BY THE WEHE APP



Source: Arcep

## 3. 2023 NET NEUTRALITY NEWS

### 3.1. In France

At the national level, Arcep continued to produce a state of the art assessing the **degree to which internet plans sold in Metropolitan France and the overseas territories comply with the principle of Net neutrality**. In particular, the Authority drew on the various reports received on practices that may infringe on Net neutrality, notably those received via the “J’alerte l’Arcep” platform.

To give an example, these user reports helped to identify a practice that made it impossible for some consumers to receive emails sent to a certain ISP’s email services. This practice could violate Net neutrality rules by creating an unjustified discrimination against users’ ability to access the internet. Arcep thus began a dialogue with the concerned parties to make changes to the service that would render it compliant with Net neutrality provisions.

Following through on the work that Arcep performed in 2022 on applying Net neutrality rules to **new use cases in the sector**, the Authority’s teams have continued to work with stakeholders on analysing the conditions of the latter’s compliance the Open Internet regulation, notably when using new network slicing technologies enabled by 5G.

### 3.2. European workstreams

Across the EU, 2023 was marked by the review of the application of the Open Internet regulation No. 2015/2120 and of BEREC guidelines that were updated in 2022.

In coherence with BEREC’s opinion on the regulation’s implementation, published in 2022<sup>8</sup>, **the European Commission’s report published in 2023 on the rules guaranteeing access to an Open Internet**<sup>9</sup> confirm that the regulation and its principles remain relevant and that it continues to “*guarantee the essential balance between the protection of end-user rights and the need to foster a competitive EU digital single market.*”

If the regulation itself does not require review, the European Commission nevertheless noted certain issues regarding its implementation. These include the need to work on the legal certainty regarding the provision of specialised services, as specified in the regulation. The Commission also notes calls for increased consideration of freedom of choice regarding devices, which is also stipulated in the regulation.

As part of its work on **cloud and Edge computing services**<sup>10</sup>, BEREC analysed possible Net neutrality issues surrounding those technologies. The Body of European regulators thus recalled that the phenomenon of network cloudification and network functionalities’ exposure to third parties must take place in compliance with the principle of an Open Internet. This transition should therefore include assurances on the openness and interoperability of these cloud and Edge computing technologies.



#### “J’ALERTE L’ARCEP”

Launched in October 2017, the “**J’alerte l’Arcep**” **platform** allows any citizen, business or local authority to report any malfunctions encountered in their use of the mobile internet, fixed internet, a postal service or press distribution service.

Arcep performed an **review of its pro-consumer actions and its “J’alerte l’Arcep”** reporting platform in 2023. Users submitted more than 53,000 reports to the Authority that year.

Of these, **313 concerned Net neutrality**. The vast majority of them (302) came from consumers. The number

of reports regarding Net neutrality logged on “J’alerte l’Arcep” has been decreasing steadily since 2018, when 680 such reports were received. This decrease can be attributed to market players’ steady alignment with the rules, resulting in the elimination of offers that violate the provisions of the Open Internet regulation. These user reports have enabled the Authority to identify possible Net neutrality infractions, and to encourage a swift resolution to the problems that arise.

The “J’alerte l’Arcep” platform is continually evolving, which includes being seamlessly integrated with other data-driven regulation tools developed by Arcep: *Mon réseau mobile*, *Ma connexion internet* and the Wehe app developed in partnership with Northeastern University.

<sup>8</sup> BEREC Opinion for the evaluation of the application of Regulation, 2024.

<sup>9</sup> Report from the Commission to the Parliament and the Council on the implementation of the provisions of Regulation (EU) 2015/2120 on open internet access, 2023.

<sup>10</sup> BEREC Draft Report on Cloud and Edge Computing Services, 2024.



## THE VIEW FROM ABROAD – NET NEUTRALITY MAKES A COMEBACK IN THE UNITED STATES

With 3 votes to 2 (3 Democrats, 2 Republicans), the Federal Communications Commission (FCC) passed the new “[Safeguarding and Securing the Open Internet Order](#)” on 25 April, which once again gives the FCC the power to regulate broadband Internet Service Providers.

**Six years after having been repealed in 2018, the FCC has thus reinstated the Open internet rules** that were adopted for the first time in 2015 and which prohibited ISPs from blocking and throttling lawful content and ban paid prioritization.

Commenting on this development, FCC Chair, Jessica Rosenworcel, stressed that the US regulator believes that “*every consumer deserves internet access that is fast, open and fair*”.

This decision – which follows a public consultation in October 2023 – plans on reclassifying

broadband internet access services as telecommunications and no longer information services. This regime,

which was in force from 2015 to 2018, means the application of Title II provisions of the Communications Act on broadband service providers. Falling under the purview of FCC regulation, ISPs must therefore once again adhere to the principle of Net neutrality, by treating and relaying all traffic on the networks fairly.

Debates on the issue have been lively since the repeal of Net neutrality rules in 2017, driving some states, such as California, to adopt laws that allow them to reinstate Net neutrality locally, without waiting for change inside the FCC.

Looking beyond the United States, **a number of countries have adopted a regulatory framework that guarantees this principle of equal treatment and handling of all data traffic on the internet.** Canada, Iceland, Norway, South Africa, Senegal and South Korea, for instance, have all enshrined in law a guarantee of upholding this principle of non-discrimination for all traffic being relayed over the internet or, more broadly, of users’ freedom to access and share the content of their choice.

### 3.3. Promoting an Open Internet beyond the networks

Lastly, because safeguarding an Open Internet does not stop at ISPs’ networks, Arcep has continued to work on promoting the issue of open devices<sup>11</sup> as part of the **work being done within BEREC on content and application providers’ (CAP) place on the networks** (See the section on “Supervising data interconnection and relationships between ISPs and content providers”). It

has focused in particular on the openness of operating systems that power connected devices such as televisions. Arcep is also investigating the **impact that generative AI is having on an open internet**, as it is becoming the new gateway between users and their content (see section on “Is artificial intelligence the new gateway to the internet?”).

<sup>11</sup> BEREC Report on the entry of large content and application providers into the markets for electronic communications networks and services, 2024.



## PART 2

# Supporting internet access that meets societal expectations and users' needs

### CHAPTER 4

Promoting the ecodesign of digital services

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### CHAPTER 5

Improving quality of service measurement

## CHAPTER 4

# Promoting the ecodesign of digital services



## THE BOTTOM LINE

- The ongoing increase in internet use and devices' data traffic will also mean that **digital technologies' environmental footprint will continue to grow if nothing is done to curtail it**. Ecodesign is one of the levers available for combatting this trend, as underscored in the ADEME-Arcep study published in April 2023.
- Arcep and Arcom together published a General policy framework for the ecodesign of digital services on 17 May 2024. This frame of reference sets out 78 criteria for working to reduce the environmental footprint of digital services.
- BEREC and its Sustainability working group, which is co-chaired by Arcep, tackled the issue of the sustainability of services and user devices in 2023 and 2024, of which their ecodesign was a key facet.

Starting in 2019, as part of its work on “Future networks,” Arcep began to train its sights on digital technologies' carbon footprint, interviewing experts from civil society, industry players and public sector actors, and publishing a first memo on the topic. The following year, Arcep wanted to open a **new regulatory chapter** devoted to environmental issues. The Authority's activities in this area are detailed in Volume 1 of Arcep's annual report ([Chapter 8](#)).

The study published with ADEME<sup>1</sup> stresses that if no steps are taken to reduce digital technologies' environmental footprint, their greenhouse gas emissions could increase by 45% by 2030, and their consumption of abiotic resources (metals and minerals) by 14%, compared to 2020. Under this “business as usual” trend, data traffic would increase sixfold and the number of devices by close to 65%, compared to 2020.

**The ecodesign of digital hardware and services has been identified as one lever for reversing the trend and reducing digital technologies' environmental footprint.**

## 1. GENERAL POLICY FRAMEWORK FOR THE ECODESIGN OF DIGITAL SERVICES

### 1.1. A collaborative work, in concertation with the ICT ecosystem and civil society

The term ‘ecodesign’ means “*the integration of environmental aspects into product design with the aim of improving the environmental*

*performance of the product throughout its whole life cycle*”<sup>2</sup>.

The french law relative on reducing digital technologies' environmental footprint assigns Arcep and Arcom the task, in concert with the National Agency for the Environment and Energy management (ADEME), of defining “*the contents of a general policy framework for the ecodesign of digital services*” (Article 25 of the REEN law).

After several months of work, Arcom and Arcep published a first **draft of the Policy Framework** on 9 October 2023, in collaboration with ADEME, la DINUM (the Inter-ministerial Directorate in charge of the State's digital transformation), CNIL (the Internet freedoms and innovation watchdog, and INRIA (National Institute for Research in Digital Science and Technology). The document was published for a public consultation that ran until 17 November 2023. Fifty seven written **contributions** were received from representatives of industry players, environmental associations, and CSR audit and consulting firms. Arcep also hosted a workshop in partnership with the *Institut du numérique responsable* (Institute for sustainable tech) on 30 October 2023, which brought together some 40 ecodesign experts from the ecosystem and civil society. A **summary** of that workshop is available online. A meeting was also held with leading telecom and tech company executives on 30 November 2023.

After having received these contributions from stakeholders, the finalised version of the General policy framework for the ecodesign of digital services (RGESN) was published on 17 May 2024<sup>3</sup>. It was presented at a launch event hosted by Arcep and Arcom, with special guests **Marina Ferrari**, Secretary of State for Digital Affairs, Arcep Chair, **Laure de La Raudière**, Arcom Chair, **Roch-Olivier Maistre**, and ADEME Chair, **Sylvain Waserman**. The event was attended by 200 guests from the digital and ecodesign ecosystem,

1 ADEME – Arcep study on the digital environmental footprint in 2020, 2030 and 2050

2 Article two of Directive 2009/215/EC establishing a framework for the setting of ecodesign requirements for energy-related products

3 The General policy framework for ecodesign is available [online](#), in [pdf](#) and in [English](#).



↑ Laure de la Raudière opens the launching event of the General policy framework for the ecodesign of digital services, on 17 May 2024 at CNAM.

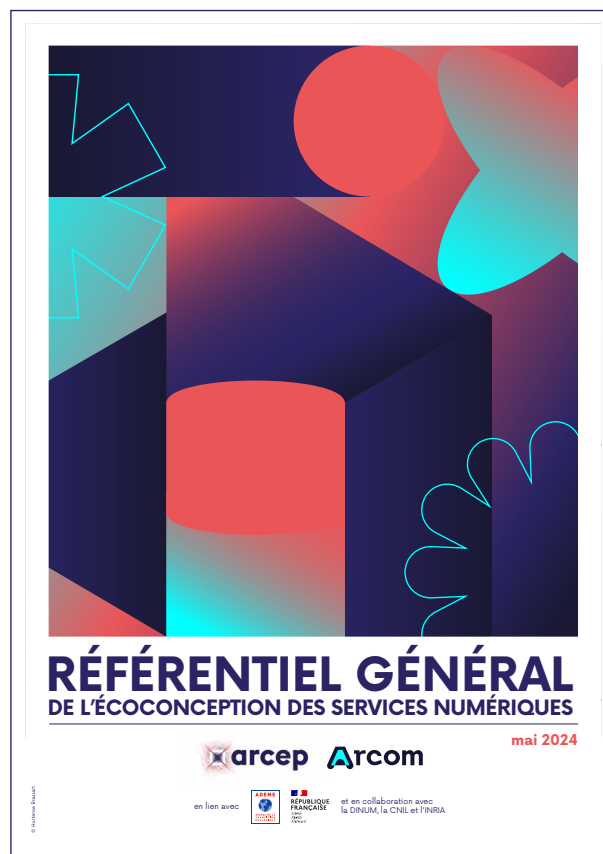
academics, public authorities and members of civil society at the National Council for Arts and Culture (CNAM).

The event also included a number of technical demonstrations, as well as a round-table discussion with players from the digital sector and representatives of associations and research organisations involved in digital eco-design (see full [programme](#)).

## 1.2. A tool to bolster digital professionals' ecodesign efforts

The general policy framework for the ecodesign of digital services proposes **78 criteria for digital professionals** (project managers, developers, designers, CRE managers, etc.) wanting to engage in an ecodesign process. It is an operational tool to encourage the development of more eco-friendly digital services (applications, websites, platforms, software, AI, etc.).

These criteria are laid out in the form of questions, designed to assess whether the operational or under-design digital service adopts an **ecodesign approach** (e.g.: "Can the digital service be used on older device models?"). By answering these questions, the service's provider, publisher or designer can construct or assess their ecodesign strategy, and identify the priority areas for improvement by relying on criteria **priority levels** ("Top priority";



↑ Coverage of the RGENS published on May 17, 2024, in [French](#) and [English](#) versions.

"Recommended" and "Moderate"), as well as a degree of difficulty ("Low"; "Medium"; "High"). Each of these criteria is accompanied by a **factsheet**, which are classified by theme, according to the stages in the service's life cycle ("Strategy", "Specifications", "Architecture", "User experience and user interface (UX/UI)", "Content", "Frontend", "Backend", "Hosting", "Algorithms").

The purpose of the General policy framework for the ecodesign of digital services is to guide a digital service's design towards **more sustainable choices**. Digital players implementing the Policy framework have the option of drafting an Ecodesign declaration of **conformity**, to provide an account of the actions taken to minimise ICT's environmental footprint. The declaration can include a progress score, creating the ability to track the service's maturity with respect to the policy framework's criteria. A Ecodesign declaration of conformity template<sup>4</sup> is attached to the Policy framework to facilitate the production of this deliverable.

<sup>4</sup> The RGENS eco-design declaration model is available in several formats:

- Text version: Office Open XML text (.docx), OpenDocument text (.odt), [HTML](#), and [plain text](#).

- Spreadsheet version: Office Open XML spreadsheet (.xlsx), OpenDocument spreadsheet (.ods). This format also allows for the calculation of the service's progress score, the details of which are specified below

## TOOLS PROVIDED TO PROFESSIONALS TO ADOPT THE GENERAL POLICY FRAMEWORK FOR THE ECODESIGN OF DIGITAL SERVICES (RGESN)



78 factsheets that specify the methods for implementing each criterion



An Ecodesign declaration of conformity template to certify the efforts deployed.



A methodology for calculating a progress score, measuring the service's alignment with the policy framework.

## WHAT DOES A GENERAL POLICY FRAMEWORK FOR THE ECODESIGN OF DIGITAL SERVICES FACTSHEET LOOK LIKE?

Name of the criterion that lays out the question to ask during the process.

3 levels of priority: high, moderate, or recommended. Necessary for calculating the progress score.

Examples of professions that may be involved in the implementation of the criterion. Provided for informational purposes only.

Steps to take to implement the associated best practice

**1 - Is the service...?**

Level of difficulty:  
\_\_\_\_\_

Priority level:  
\_\_\_\_\_

N/A:  
\_\_\_\_\_

Occupations involved:  
\_\_\_\_\_

**Targets**  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Implementation**  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Testing or monitoring method**  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3 levels of difficulty: high, medium, and low. Provided for informational purposes only.

Conditions for considering whether the criterion is applicable or non-essential for calculating the score

Impact reduction target

Method for verifying that the criterion and information to be mentioned in the Ecodesign declaration of conformity have been validated

### 1.3. What lessons to draw from the policy framework criteria, for more sustainable digital technologies?

The criteria of the General policy framework for the ecodesign of digital services have four main goals:

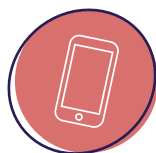
#### 1/ Design more sustainable digital services to extend devices' lifespan

The General policy framework encourages the development of more sustainable and interoperable services, to help extend the life of devices. This includes services' compatibility with older devices, optimising performance to match the context of use and to leverage Open source to extend the life of services and devices.

## GENERAL POLICY FRAMEWORK FOR THE ECODSIGN OF DIGITAL SERVICES CRITERIA FOR EXTENDING THE LIFE OF DEVICES



The digital service can be used on old devices (minimum 7 – 10 years old, depending on the type of service)



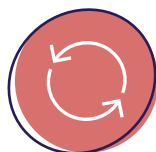
The digital service can be used on different types of display, depending on the type of device



When the service is associated with a device, it provides updates throughout the product's entire expected lifespan



The digital service (excl. native applications) must be usable on versions of a web browser that are more than 2 years old



The digital service works on old operating systems (5 years or +)



The digital service runs on open APIs, to facilitate maintenance of the connected object or associated peripheral

## 2/ Promote a mindset of striving for eco-sufficiency in response to online attention-grabbing strategies, to align with international environmental targets

The business model of some digital services is based on capturing users' attention, thanks to the exploitation of increasing amounts of available data, computing capacity and increasingly streamlined profiling mechanisms. This attention economy encourages users to spend more and more time online, which can run counter to the goal of eco-sufficiency. The general policy framework for ecodesign therefore includes criteria aimed at limiting the **negative effects of the attention economy**, notably: infinite scrolling, autoplay, pop-up notifications, etc. It also seeks to hand control back to users, e.g. by introducing a Green/eco-sufficiency mode or an energy consumption tracking indicator.

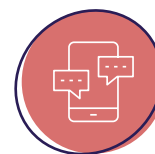
### GENERAL POLICY FRAMEWORK FOR THE ECODESIGN OF DIGITAL SERVICES CRITERIA FOR LIMITING THE EFFECTS OF THE ATTENTION ECONOMY



The digital service does not use infinite scrolling



The clickstream is optimised and does not include dark patterns



The digital service minimises notifications and gives users the ability to control them



The service minimises data and metadata collected for ad-driven user profiling



The service gives users the means to monitor and manage their ICT consumption



Multimedia content is useful to the service's functionalities and does not autoplay

### 3/ Decrease the IT resources mobilised over the digital service's life cycle, including by optimising data traffic and digital infrastructure use

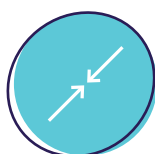
The provision and use of a digital service relies on the allocation of raw materials, **IT resources** and the operation of infrastructure, all of which have an impact on the environment. Some of the Policy framework's criteria thus seek to minimise the resources used by digital services' different building blocks (native components, third-party services, asynchronous computing). It also encourage the use of content file size **optimisation**, including multimedia, as well as a sustainable hosting solution.

By applying these criteria, digital sector players can, for instance, achieve more sustainable video design and more eco-friendly AI.

#### GENERAL POLICY FRAMEWORK FOR THE ECODSIGN OF DIGITAL SERVICES CRITERIA FOR MORE ECO-FRIENDLY VIDEO



Autoplay is disabled



The digital service uses efficient video compression codecs



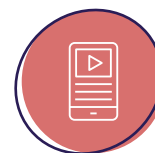
The digital service tailors videos' definition to the viewing context, notably the size of the device



The service offers users an "audio only" option

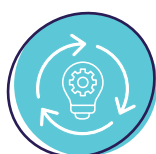


Every video contains information and serves the service's functionalities



An energy-saving mode is made available to users, with reduced definitions

#### GENERAL POLICY FRAMEWORK FOR THE ECODSIGN OF DIGITAL SERVICES CRITERIA FOR MORE ECO-FRIENDLY AI



The training phase is justified by the service's targets and needs



Training complexity, quantity and frequency are proportionate to actual use of the service



Hosting used along the service's entire value chain helps limit associated environmental impacts



The quantity of data used for the learning phase is limited to what is strictly necessary



The inference phase factors in environmental issues and aligns with target users' needs



Compression techniques are used for training phase models

#### 4/ Increase transparency on the digital service's environmental footprint

The Policy framework includes criteria aimed at encouraging digital sector players to be environmentally transparent by publishing **data on their services' environmental footprint**, and documenting their efforts to reduce it. In other words, in keeping with this data-driven approach to regulation, they are being urged to publish reliable, robust and comparable environmental indicators which, in turn, can create positive incentives for the development of eco-friendly solutions, while working to inform users on the environmental impact of their uses of digital technologies.

### GENERAL POLICY FRAMEWORK FOR THE ECODESIGN OF DIGITAL SERVICES CRITERIA TO INCREASE ENVIRONMENTAL TRANSPARENCY



The digital service's utility is assessed transparently



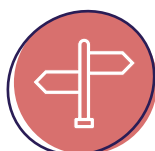
The service defines and communicates its environmental footprint reduction targets



The service makes the assessment of its environmental impact available



The service's hosting is transparent about its environmental performances and footprint reduction targets



Users have access to information on the environmental footprint of their own usage



The digital service publishes an Ecodesign declaration of conformity based on the Policy framework

#### 1.4. Supporting the ecosystem's implementation of the policy framework

To monitor the implementation of this new incentivising framework, and foster an exchange of best practices between market players, Arcep and Arcom will host a **Digital eco-design stakeholders' forum**. Ecodesign experts wanting to apply to join the supervisory committee, or keep up with the latest news, [can send their requests](#) via the [contact form](#) on Arcep's website.



# 3 questions to



## MELLIE LA ROQUE,

*Service Designer for SNCF Connect & Tech and Co-initiator of "Designers Éthiques".*

### Can you tell us a little about your background, and what led you to become involved in the environmental issues surrounding ICT?

Very early on in my career, I began thinking about digital technologies' impact on the environment, and my responsibility as someone working in tech. My university studies ended with a dissertation on designer ethics. This laid the foundation for my work, which informed my commitment to one particular aim within the Designers Éthiques association: working to make digital technology sustainable, ethical and enabling for individuals, society and the environment.

This action research structure seeks to challenge the practice of design and ICT through events like Ethics By Design, the publication of tools and course. This commitment carries through my work as a designer in a consulting firm, and in today in B2C sustainable mobility sector with SNCF Connect & Tech.

This examination of my profession has led to one overarching conclusion: all of our design choices have repercussions, externalities not only for users but for the environment as well, not least throughout a digital product's life cycle. These impacts are felt in the extraction, production, usage and end of life phases. As designers, we have a key role to play and a responsibility to address these environmental issues, not least by applying digital ecodesign best practices.

### What are the key pillars of the SNCF Connect & Tech strategy for digital sustainability? What are the priorities and initiatives put into place for making SNCF Connect & Tech digital services more sustainable and eco-friendly?

At SNCF Connect & Tech, which is a private subsidiary of SNCF Voyageurs, digital sustainability must be synonymous with assuming our civic responsibility to our users, and reflect the values we champion as actors in the Green transition.

To achieve a convergence of our corporate mission and the development of a sustainable product, our ethical digital strategy is shouldered by all of our teams, and revolves around four pillars: incorporating digital sustainability and ethics into all of our projects, reducing our IS's environmental footprint, making our digital services accessible and developing sustainable practices thanks to our services.

Our sustainability goals are being achieved through priority actions for the Products and Tech teams: by teaching and training Design, PM/PO and Tech teams digital ecodesign with Designers Éthiques, GreenIT, Temesis, the incorporation of ecodesign best practices in industry processes based on standards such as the General policy framework for the ecodesign of digital services (RGESN), measuring the performance of our clickstream with Greenspector, and bringing our ecodesign commitments to life in how we design our features and our services.

### How do you think the General policy framework for the ecodesign of digital services (RGESN) can assist organisations such as SNCF Connect & Tech in gaining control over their digital services' environmental footprint?

As the Government's policy framework, the RGESN has become part of a virtuous circle of existing standards, such as the RGAA, the GDPR, the RGS, the RGI, and the R2GA. They help our organisation master our environmental footprint on three fronts:

- **Strategy and transversality**, its theme-based construction – strategy, UX/UI, Architecture... – provides a common framework and includes every stakeholder. Every occupation is brought into an approach that extends beyond optimisation, but triggers a thought process and overall strategy for digital services' environmental impact.
- **Application and business practices**, with its structure in the form of criteria and questions, the RGESN is a tool that can be translated into concrete actions for every team member. Each question is attached to a clear objective and a means of implementation. Designers can identify paths for improvement and the level of priority in a clear and consistent fashion.
- **Compliance and legal framework**, by complying with the REEN Act on reducing ICT's environmental footprint, the RGESN is an integral part of French regulation. As a policy framework, it helps foster understanding and enables the application of a future obligation for enterprises. The Policy framework lays a path for steadily achieving compliance, in the form of an Ecodesign declaration of conformity.

In other words, the RGESN provides a concrete framework for the application of ecodesign. Looking beyond our organisation, it is an opportunity to galvanise digital sector stakeholders onto a path towards digital sustainability.

# 3 questions to



## CHRISTOPHE CLOUZEAU

*Expert in Green-UX, ecodesign and digital sustainability for Temesis (Ctrl-a group) and member of the Institut du Numérique Responsable (INR)*

### Could you explain how you came to work in the field of ecodesign and what drove you to become so committed to it?

It happened gradually during my time as the head of a digital design agency. Around 2008, in deference to their Green policies carrying sustainable development targets, some of our clients asked that we no longer produce hard copies of their publications to “stop cutting down trees and save the planet”. Around two years later, these same clients began asking us to design two versions of their annual reports: print + digital. I think that was when I began thinking seriously about the environmental and societal arguments surrounding the process.

In 2010 I approached Frédéric Bordage, and began to contribute to Green-IT training, to the drafting of 115 Best Practices (edition 2). More than anything, I just naturally dove into my comfort zone: communicating with the public and with professionals. Through an independent collective webzine and conferences, I demonstrated that ICT have concrete and tangible impacts, well beyond their intangible aspect.

After 13 years at the head of that digital design agency, I switched from the operational world and the world of blogging to the consulting sector by joining the firm Temesis in 2020, to develop their Ecodesign division. This gave me the ability to become part of different working groups with the INR, the Green-IT collective, Boavizta, AFNOR. In particular, I helped to draft the General policy framework for the ecodesign of digital services, starting with its beta version in May 2021. The goal of putting such a policy framework into place was a huge source of motivation for me!

### In what concrete ways does the General policy framework for the ecodesign of digital services (RGESN) help you in your activities? Can you give some concrete examples of its application and its benefits?

As we at Temesis explain during our vocational training sessions, the RGESN is useful on three fronts.

The first is **Training** or self-training: it is important to read the criteria before beginning a digital service project. The goal is not to master but to know them, in the same way as RGAA or GDPR criteria.

The second is **Support** tied to the process of creating a digital service. From the project launch meeting onwards, we define compliance with each RGESN criterion with all members of the team and project stakeholders. Then, during the execution stage, we check that the teams are tracking their compliance to be able to compare each development.

The third is the **Audit** of an existing digital service. It gives us the ability to measure the maturity of the process that has begun, and to validate the process of the delivered product.

Training, support and audit are the three core activities of our Digital ecodesign division at Temesis. The RGESN is thus an intrinsically integral part of our process.

### What would be your three key recommendations for professionals who are just discovering ecodesign and want to reduce their digital services' environmental footprint?

From an entirely practical standpoint:

- Training and awareness-building for everyone, including those in charge of governance. Then targeted training for the different members of the design team (design, strategy and even after sales) and the technical development team.
- An audit of a “small” or “simple” digital service whose redesign has been planned. Otherwise, the next project starting from scratch. This limited size keeps the issues surrounding the project manageable and to proceed with a small team.
- Obtain support for the ecodesign of this identified digital service. The purpose of this support has the common aim of complying with RGESN criteria, which have been reviewed during the launch meeting with all of the project's stakeholders. Gauging the weight of the resources, the data and service requests that need to be redesigned also create the ability to obtain an addition KPI that is shared by the whole team: reduce these metrics by two, for instance. The project's finalisation will give the team a chance to obtain feedback from other members inside the organisation, with an emphasis on reducing the environmental footprint. The members of this small team will then become identified contacts who can then, in turn, assist in future projects within the organisation.

## 2. PROMOTING THE ECODESIGN OF DIGITAL SERVICES ACROSS THE EU

Digital technologies' environmental footprint has been a part of the Body of European Regulators for Electronic Communications' (BEREC) strategy for 2021 – 2025 since 2020. **BEREC's work on environmental** issues is conducted by its "Sustainability" working group, which is currently co-chaired by Arcep.

At the end of 2023, BEREC held a public consultation on a **report on empowering end users** through environmental transparency on digital products<sup>5</sup>. Among other things, the report highlights the need to factor in the entire life cycle of digital services, and promote sustainability by default. By drawing on the work of the European Environmental Bureau (EEB), the Bureau of European Union Consumers (BEUC) and the European Commission (DG Energy<sup>6</sup> external study), this report underscores advances in the ecodesign of devices, and pioneer initiatives for applying this principle to digital services. It also addresses the issues surrounding the **attention economy** and the impact of **emerging technologies**.

BEREC is also working to promote the **ecodesign of generative AI-based services** and virtual worlds, in response to the European Commission public consultation. In its contribution, the Body stressed the need to assess and monitor generative AI's environmental footprint, and promote sustainable design by default, factoring AI's power consumption into Member States' energy planning. BEREC also called for these ecodesign issues to be taken into account when drafting European aid policies for innovation.

Making service providers accountable for their sustainability and ecodesign is also among the topics being tackled by the European Commission, for instance in its **White Paper** on the future of digital infrastructures in Europe published in 2024<sup>7</sup>. BEREC will contribute to the Commission's work in this area, as one of the Commission's proposals is to **strengthen European NRAs' environmental protection mandate**.

<sup>5</sup> BEREC, [Report on ICT sustainability for end-users](#), 2024.

<sup>6</sup> European Commission: "[Assessment of the energy footprint of digital actions and services](#)", 2023.

<sup>7</sup> European Commission: "[White Paper How to master Europe's digital infrastructure needs?](#)", 2024.

## CHAPTER 5

# Improving quality of service measurement



## THE BOTTOM LINE

- In 2023, Arcep changed its mobile QoS measurement indicators for download speeds, and incorporated new QoS indicators for voice calls made using an instant messaging app<sup>1</sup>.
- The results of the 2023 QoS audit reveal high quality of service for the mobile internet (web browsing and video streaming) in high-density areas for all operators. Looking specifically at transport routes, quality of service remains decent in terms of performance along roadways, but is middling on TGV high-speed trains, on the “Intercités” commuter and TER regional rail networks.
- Regarding fixed networks, the “access ID card” API, designed to achieve more accurate measurements, has been installed on the top four ISPs’ routers in customers’ homes, and, for the first time, the nPerf tool has used the data obtained from the API to refine its analysis.

1 Over The Top (OTT) application

## 1. THE CHALLENGES OF MEASURING INTERNET ACCESS QOS

When it comes to internet access, quality of service (QoS) depends in part on infrastructures providing faster connections, notably via the deployment of fibre on fixed access networks, and investing in mobile networks. Arcep’s overall actions in the areas of network deployment and quality of service (see the results of Arcep’s works on fibre quality of service) are addressed in [Volume 1 of Arcep’s annual report](#). This Chapter of the report on the State of the internet in France focuses specifically on the Authority’s work on **measuring internet access quality of service**.

Every year, Arcep performs a QoS audit of operators’ mobile services, whose purpose is to assess the performance of these operators’ networks in a strictly comparable fashion. To this end, the Authority considers an array of circumstances of use (in the city, in rural areas, on different modes of transport, etc.) and the main services used (calling, texting, loading a web page, video streaming, file downloads, etc.). These analyses are made available to the public on the “[Mon réseau mobile](#)” (My mobile network) website.

For fixed networks, the quality measured can depend on the Internet service provider’s (ISP) access network, the quality of the local network but also on whether a Wi-Fi network is being used, the quality of that Wi-Fi network and/or how many other devices are also using the local network when the test is being performed.

All of these elements make up the “user environment” that can be hard to characterise, but can also have a tremendous impact on the results of the speed/QoS test. Which is why, in early 2018, Arcep began a wide-ranging initiative that called upon all of the market’s stakeholders to help solve this challenge of accurately measuring quality of service on fixed networks. This **co-construction approach** involves some 20 players, including crowdsourcing measurement tools, ISPs, consumer protection organisations and academia. It led to the development of the “**access ID card**” API that enables testing tools to obtain a more detailed and accurate characterisation of the fixed network user environment.

## 2. MOBILE INTERNET QUALITY OF SERVICE IN 2023

In October 2023, Arcep published the findings of its annual QoS [audit of mobile operators in Metropolitan France](#). This audit, which is based on more than a million measurements taken of 2G, 3G, 4G and 5G networks in every department of Metropolitan France, was carried out between mid-May and mid-August 2023, in living environments indoors and outdoors, and on various forms of transportation (roads, metros and trains). Arcep invites everyone to view the detailed findings using the “[Mon réseau mobile](#)” tool <https://monreseaumobile.arcep.fr/>, to compare performances according to the type of area where they live (high-density, medium-density or rural) and the type of transport they use.

Arcep collects, and also publishes on “Mon réseau mobile,” data from the audits performed by third parties (notably local authorities) provided they comply with the measurement protocol set forth in the “regulator’s toolkit”<sup>1</sup>.

### 2.1. Indicators amended to more accurately reflect the user experience

For the 2023 mobile QoS audit, Arcep revised its indicators for downlink speeds to more closely align with user practices. The aim is to better inform consumers about downlink speeds, tailored to their particular needs, for which three thresholds were established;

- **3 Mbit/s:** speed suited to the least demanding mobile internet uses, such as web browsing;
- **8 Mbit/s:** speed suited to the most widespread uses, such as video streaming;
- **30 Mbit/s:** speed suited to the most demanding uses, such as collaborative tools for business purposes.

This approach has the added benefit of not creating an incentive for operators to engage in a “maximum debit race”, but rather to be part of the drive to achieve digital sustainability, initiated by Arcep.

For the first time, Arcep also included measurements of voice quality for calls made using an instant messaging app<sup>2</sup> in its series of tests.

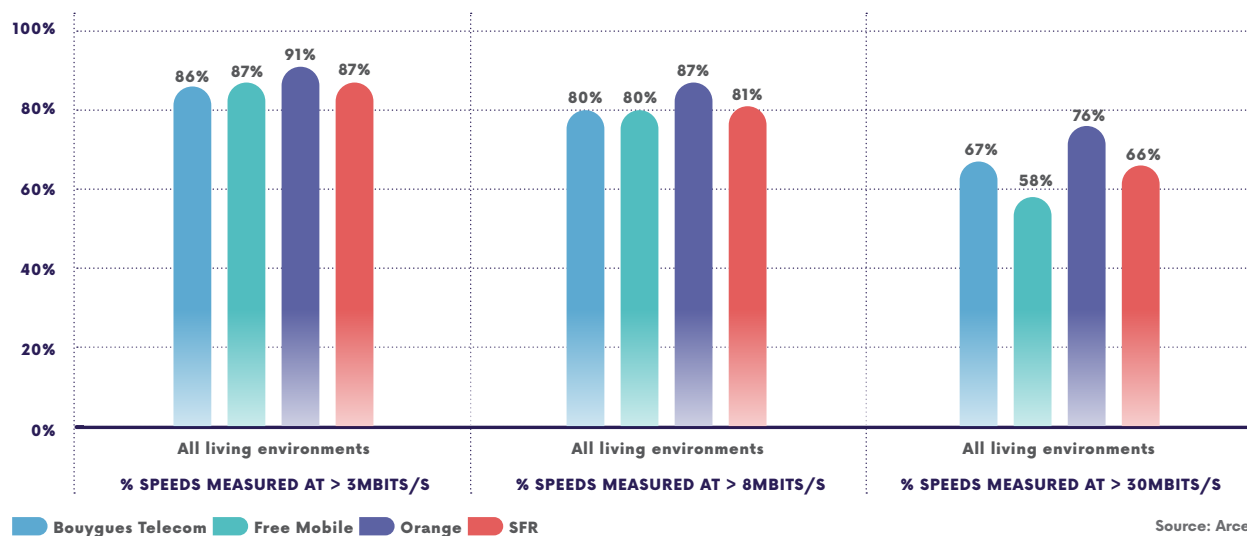
### 2.2. Main findings of the 2023 mobile QoS audit<sup>3</sup>

#### a. Mobile internet: main findings

For the “3 Mbit/s” and “8 Mbit/s” downlink speed thresholds, all types of living environment combined: Bouygues Telecom, Free Mobile and SFR are neck and neck behind Orange which scores the highest overall on these indicators.

In high-density areas, Orange and Bouygues Telecom stand out with equally strong performances.

**PERCENTAGE OF DOWNLINK SPEEDS EXCEEDING THE 3 MBIT/S (LEFT), 8 MBIT/S (CENTRE) AND 30 MBIT/S (RIGHT) THRESHOLDS BY OPERATOR AND ALL TIERS COMBINED**



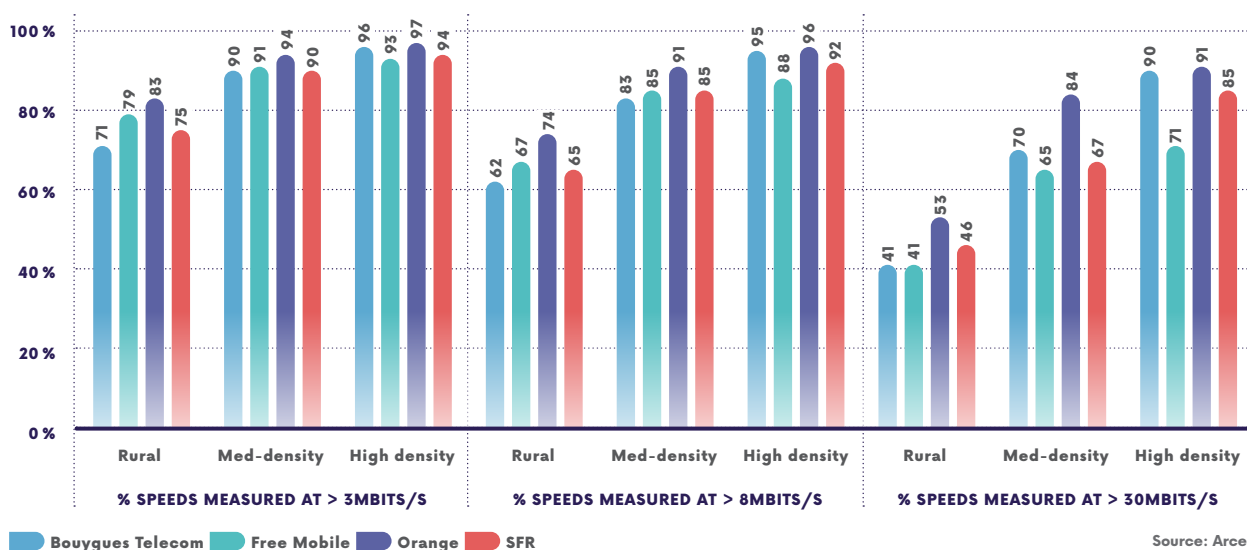
Source: Arcep

1 Regulator’s toolkit: [https://www.arcep.fr/fileadmin/user\\_upload/grands\\_dossiers/qualite-services-mobiles/kit-du-regulateur-2022v03.pdf](https://www.arcep.fr/fileadmin/user_upload/grands_dossiers/qualite-services-mobiles/kit-du-regulateur-2022v03.pdf)

2 Over the top (OTT) application

3 Details of the 2023 audit can be viewed by clicking on this link (Annex 2): <https://en.arcep.fr/news/press-releases/view/n/mobile-quality-of-service-in-metropolitan-france-261023.html>

**PERCENTAGE OF DOWNLINK SPEEDS EXCEEDING THE 3 MBIT/S (LEFT), 8 MBIT/S (CENTRE) AND 30 MBIT/S (RIGHT) THRESHOLDS BY OPERATOR AND BY STRATA**



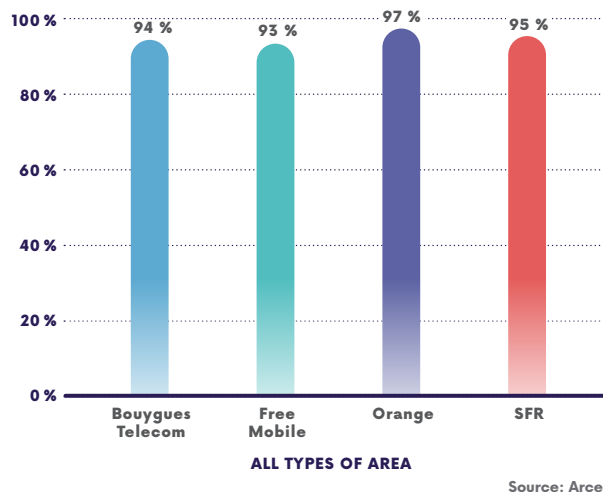
For all the other web browsing and **video streaming** indicators, all four operators provide a high quality of mobile internet service in densely populated areas. For video streaming in 2G/3G/4G/5G in rural areas, Orange tops the rankings (89%), ahead of SFR (85%), Free Mobile (84%) and Bouygues Telecom (82%). In densely populated areas, Bouygues Telecom, Free Mobile, Orange and SFR all score a rate of 97% of videos streamed with perfect quality.

Regarding **web browsing**<sup>4</sup> in high-density areas, Orange (97% of pages loaded in under 10 seconds) and Bouygues Telecom (96%) are followed by SFR (94%) and Free Mobile (93%). In rural areas, Orange (84%) is followed by Free Mobile (78%) and SFR (77%) then Bouygues Telecom (75%).

**b. Voice and texting using a messaging app: QoS audit findings**

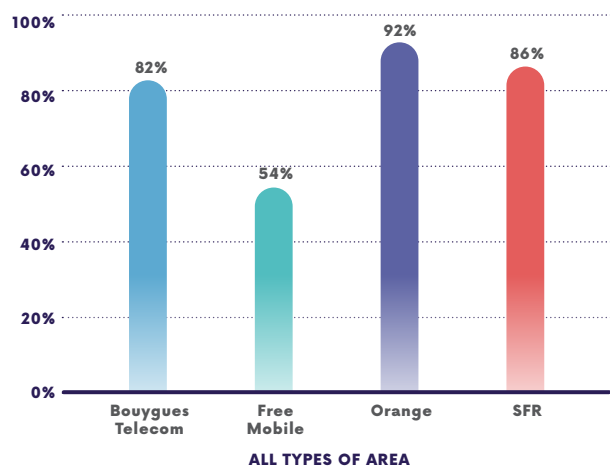
Regarding calls made through an instant messaging application, for successful calls, all situations and all types of area combined, the four operators provide a high level of connectivity with a success rate of 97% for Orange, 95% for SFR, 94% for Bouygues Telecom and 93% for Free Mobile.

**SUCCESSFUL COMMUNICATIONS VIA AN OTT MESSAGING SERVICE – BOUYGUES TELECOM, FREE, ORANGE, SFR**



<sup>4</sup> The web pages tested vary from year to year, which can result in a more or less lengthy load time due to the presence of high definition images, complex scripts, plugins, widgets, and other interactive elements.

## SUCCESS RATE OF COMMUNICATIONS WITHOUT AUDIBLE DISTURBANCE VIA A MESSAGING APPLICATION BY OPERATOR



Source: Arcep

N.B.:

- The volume of measurements was adjusted proportionate to these uses whose adoption is still by a minority of users;
- Only one of the most popular platforms was tested;
- The quality of these voice calling services can vary depending on the version and users' personal settings.

Performance gaps are widening for **perfect quality calls** (the success rate for maintaining a two-minute call without audible interference), with a 92% success rate for Orange, 86% for SFR, and 82% for Bouygues Telecom. Free lags behind on this indicator in every type of area and for all types of use, with a 54% success rate.

### c. QoS along transport corridors: key findings

On average, all operators combined, internet **quality of service** stays very high, with a close to 92% success rate for web page loads in under 10 seconds on the roads tested. The situation is more nuanced on railway lines: a web page can be loaded in under 10 seconds in only 70% of cases, on average, on TGV high-speed trains, Intercités and TER (regional express) lines. Browsing is more fluid on RER and Transiliens commuter trains in the Paris region (85%) and in the metro (96%).

Results on **web browsing quality** tests (web page loaded in under 10 seconds) on roads, SFR (92%), Bouygues Telecom and Free Mobile (91%) are all close behind Orange (95%).

Orange delivered the strongest performance **on long distance railway lines**, with a 79% success rate for web page loads in under 10 seconds on the **TGV high-speed rail lines**, ahead of Free Mobile (73%), SFR (65%) and Bouygues Telecom (64%). On **Intercités and TER** regional express networks, Orange had a success rate of 77%, followed by Free (70%) then Bouygues Telecom and SFR (66%).

On **commuter lines in the Paris region** (RER and Transiliens), Bouygues Telecom (84%), SFR and Free Mobile (83%) are behind Orange which scored highest with a 90% success rate for web browsing. On metro lines, three operators are providing a good quality of service, with Orange (98%), SFR and Bouygues Telecom (97%) leading Free Mobile (94%).

## 3. DEPLOYMENT STATUS AND USE OF THE "ACCESS ID CARD" API

To enable stakeholders involved in measuring speed and QoS to better characterise the user environment, the ecosystem reached a consensus on introducing an Application Programming Interface (API) that would be accessible to speed/QoS tests. This software interface creates the ability to transmit the information that makes up the "access ID card" to the testing apps.

The purpose of the "Access ID card" API is to **characterise the testing environment**. It will be accessible to crowdsourcing measurement tools that users employ to test their connection speed and the overall quality of their Internet connection. Requested only when the user initiates a speed test, and remaining under their control, the API will provide the measurement tool with a set of technical indicators such as the type of router and Internet access technology being used, and the advertised upload and download speeds.

Arcep chairs the **working group** that led to the API's installation on the main ISPs' routers<sup>5</sup>. Today, the API is being used by all four ISPs. The list of compatible routers is updated regularly on the [Arcep website](#).

<sup>5</sup> The list of compatible routers can be found on Arcep's [website](#), and is updated regularly.



## HOW DOES THE API WORK?

The above diagram describes **how the API works** when a customer initiates a QoS test using a tool that has access to the API.

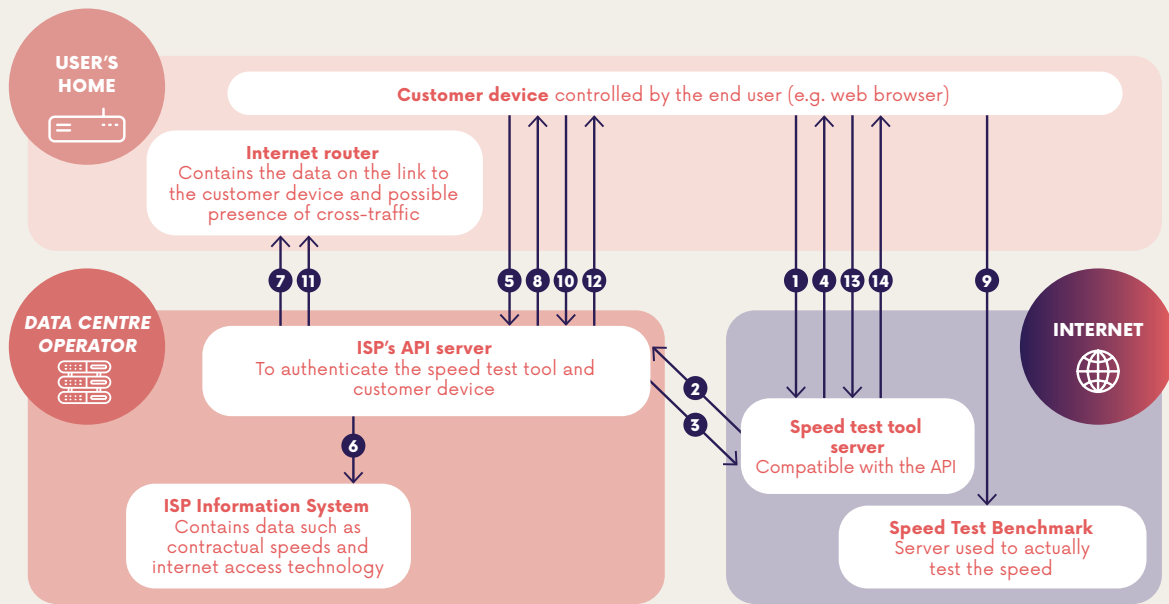
**Two calls are made to the API:** the first right before the test and the second right after. The purpose of these calls is to retrieve the different indicators to be able to characterise the link between the user device and the internet, while ensuring there was no **cross-traffic**, in other words traffic other than what was being tested (e.g. traffic from another PC or smartphone, TV box or another test programme on the computer). To achieve this, the testing tool will compare the quantity of data that it sent and received on the internet and the quantity of data that was transmitted on the internet by the router, between the API's first and second call.

## Can the API be accessed from the Internet?

No, the API can only be accessed **from the end user's local network**. The API's call must be made on the ISP's server from the customer's IP address.

Requests from other IP addresses will be rejected, to ensure the system's security. It is therefore only the tool used to run the test on the customer's device that can call the API. There is also an access restriction system in place so that only the authorised tools can access the API.

## HOW THE "ACCESS ID CARD" WORKS



- 1 The user goes to a website to test their line's speed and authorises an API call
- 2 The speed test tool authenticates itself and requests a token from the ISP, authorising the user to query the API
- 3 The ISP delivers a token to the tool, which enables the customer device to query the API, while limiting the request to the customer's IP address and to only a few minutes
- 4 The customer device collect the token from the tool
- 5 The user's browser software connects to its ISP's API, which checks the token's validity
- 6 The API queries the information system to retrieve some of the data
- 7 The API queries the user's box, to retrieve the rest of the data
- 8 The data from the API are sent to the user device
- 9 The user's browser software launches the speed test on a test target: a server dedicated to this purpose
- 10 The user's browser software connects to the API for the second call, to check whether there was cross-traffic on the line
- 11 The API queries the user's box, to retrieve cross-traffic data
- 12 Data from the API's second call are sent to the user device
- 13 The user's browser software transmits the speed test results and API data to the speed test tool's server
- 14 The tool delivers the enhanced information to the user
- 15 The tool delivers the enhanced information to the user

Source: Arcep

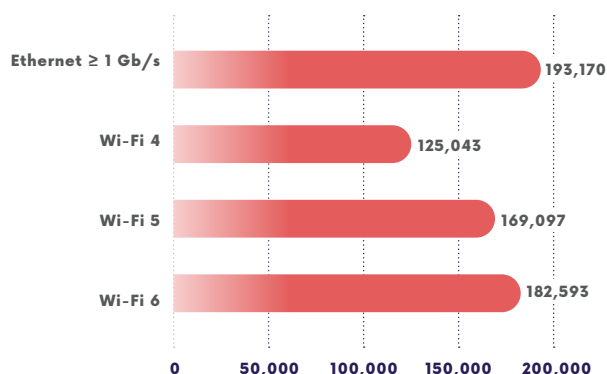


The nPerf testing tool has also incorporated the API into its barometer of fixed network connections<sup>6</sup> and fixed Wi-Fi connections<sup>7</sup>. The API's data make it possible to more accurately characterise the connection used on the end user's local network to run the tool's test: Ethernet, Wi-Fi 4, Wi-Fi 5 or Wi-Fi 6, (if the router and the device used to run the test are both Wi-Fi 6 compatible).

For the first time this year, the two nPerf barometers published a summary that takes the local network's connection into account. **These data confirm how the user environment influences quality of service:** to obtain faster fibre connections, an Ethernet or Wi-Fi 6 connection (on both the router and the device) is required.

Arcep continues to work on its "access ID card" API to enable other players involved in speed and QoS testing to adopt it.

### NPERF SCORE OF THE CONNECTION BASED ON THE USER ENVIRONMENT



Source: nperf.com

<sup>6</sup> nPerf, [Barometer of fixed internet connections in Metropolitan France, 2024](#).

<sup>7</sup> nPerf, [Barometer of fixed internet connections in Metropolitan France, 2024](#).

## PART 3

# New responsibilities and reflections on digital and the future of the Net

### **CHAPTER 6**

New responsibilities in regulating cloud computing and data intermediation services

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### **CHAPTER 7**

Implementing a European regulation of digital gatekeepers

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### **CHAPTER 8**

Is artificial intelligence the new internet gateway?

## CHAPTER 6

# New responsibilities in regulating cloud computing and data intermediation services



## THE BOTTOM LINE

- 2023 was marked by two key stages in **Europe's data strategy**: the entry into force of the Data Governance Act, which seeks to promote the emergence of new **data market players**, and the adoption of the Data Act, whose goal is to foster an open cloud services market.
- The **Act on Safeguarding and regulating cyberspace**, which entrusts Arcep with new responsibilities in regulating data intermediation services, as set forth in the DGA, and in regulating cloud computing service providers, as stipulated in the Data Act. Arcep also became a member of European data innovation board (EDIB).
- The impact of **AI's** development is a new area of focus for Arcep.

Europe's data strategy, as announced by the European Commission in 2020, seeks to create a **single data market** that safeguards Europe's global competitiveness and sovereignty in the data market. This strategy made tremendous strides in 2023: the entry into force of the [Data Governance Act](#) (DGA) in September 2023, and the adoption of the Data Act (DA) in December 2023, as well as the first meeting of the **European Data Innovation Board** (EDIB).

## 1. THE DATA GOVERNANCE ACT: FOSTERING THE EMERGENCE OF NEW DATA MARKET PLAYERS

The DGA seeks to increase the openness of public data and facilitate data sharing between different sectors, while also making these exchanges more trustworthy. In particular, the Act creates

a legal framework for all **data intermediation** service providers. Also called data intermediaries, these players operate as neutral, trusted third parties that connect individuals and businesses that own data with data users, for instance through data marketplaces.

The Act on "Safeguarding and regulating cyberspace" of 21 May 2024 assigns Arcep **new responsibilities** to work on furthering the development of the **data economy**, in particular as the competent authority for the regulation of data intermediation service providers. It is in this capacity that Arcep receives notifications from data intermediaries operating in France, and is responsible for assigning the **label of "data intermediation services provider recognised in the Union"**. To develop a harmonised European approach to regulating data intermediaries, Arcep is engaged in an ongoing dialogue with its EU counterparts, notably within the European Data Innovation Board. In 2023, Arcep had already begun working with the data intermediary ecosystem to prepare for the regulation's implementation.

## 2. THE DATA ACT: FOSTERING AN OPEN CLOUD SERVICES MARKET

The **Data Act** is also an integral part of Europe's data strategy, and pertains to both the **Internet of Things** (IoT) and the cloud computing market. In both cases, the Act seeks to give users control over their data. In the cloud computing market, it seeks in particular to facilitate the process of switching providers to enable businesses to switch to the solution best suited to their needs, and to be able to use multiple suppliers at once. To this end, it contains measures for reducing the **fees charged for switching** cloud service providers, as well as technical measures for promoting the interoperability and portability of cloud services.

In preparation for the Data Act, the Act on "Safeguarding and regulating cyberspace" also assigns Arcep new responsibilities for work on fostering an open cloud services market. In particular,

Arcep has been tasked with stipulating the essential **data and applications interoperability and portability** requirements imposed on cloud service providers. Arcep will also contribute to ensuring these same service providers comply with an obligation to charge strictly cost-based data transfer and vendor switching fees. To prepare for the implementation of these newfound responsibilities, Arcep has begun a dialogue with **cloud** ecosystem stakeholders, and its users, to forge a detailed understanding of their needs and expectations.

Meanwhile **BEREC** has begun work on the implementation of the Data Act, following through on earlier work, including the workshop on cloud services' interoperability and portability<sup>1</sup>.



### WHAT IS THE DATA ACT?

**Regulation 2023/2854** on harmonised rules on fair access to and use of data, commonly referred to as the Data Act, constitutes a new pillar in Europe's data strategy. At a time when **connected objects** are generating more and more data traffic, the aim of this regulation is to establish clear and fair rules for accessing and using the data produced by these objects and, more generally, to create a competitive and innovative data and data processing services market.

It lays down **new rules for enabling connected product users to access the data** they produce and share them with third parties. The owner of farming or manufacturing equipment will, for instance, be able to ask the equipment's manufacturer to share some of the data generated by its use. It also introduces provisions for protecting businesses against abusive clauses in data sharing contracts.

Moreover, as concerns **cloud** computing, the regulation seeks to lift **existing** contractual, pricing and technical barriers in this market, to make it easier for businesses in particular to switch from one service to another according to their needs, and available competing solutions. It will also give users the ability to combine cloud services from multiple vendors (multicloud), e.g. to create a back-up solution or to take advantage of innovative services developed exclusively by certain providers.

From a more general perspective, the regulation introduces measures for promoting the **establishment of interoperability** standards for data sharing and for data processing services, e.g. for data spaces.

Lastly, the regulation contains provisions that will enable public sector entities to access data owned by the private sector, and to use them to handle public emergencies, following through on the crisis management put into place during the Covid-19 epidemic.

<sup>1</sup> Further information available on the [BEREC](#) website.

### 3. EUROPEAN DATA INNOVATION BOARD

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The **European Data Innovation Board** (EDIB) was created by the Data Governance Act, and began its work in 2023. Arcep was appointed to represent French authorities on the Board, alongside CNIL, and has attended the Board's first meetings.

One of the Board's missions is to advise and assist the **European Commission** in crafting a clear and consistent course of action for applying the Data Governance Act. This could, for instance, concern ways to formalise and verify the requirements that apply to data intermediation service providers regulated by the DGA, the penalty mechanisms that apply to them, or to issue recommendations on interoperability standards.

Since the Data Act's adoption in December 2023, the Board has also been entrusted with tasks concerning the consistent application of this regulation. This includes supporting the European Commission in defining harmonised standards applicable to cloud services, to European data spaces and to intelligent contracts, notably to facilitate the interoperability of these services. The implementation of these standards could lead to the drafting of implementing texts for the regulation. The Board may also be involved in drafting a delegated act establishing an oversight mechanism for cloud service switching fees. Lastly, the Board must act as a platform for facilitating cooperation between competent authorities, and helping them to develop their expertise in the subjects covered by the regulation.

# 3 questions to



## SÉBASTIEN PICARDAT

*President de of the Data Intermediation Association (AID)  
and CEO of Agdatahub*

### **What is a data intermediary and why do you think the development of this activity is important? What does this activity bring to businesses?**

The status of data intermediary is recent, even if this is not an entirely new activity. Data exchanges and data platforms that provide the ability to orchestrate secured transactions between data owners and buyers have been around for some time. What is changing is that the status of data intermediary has now been written into Europe's Data Governance Act (DGA), one of multiple legal texts that enshrine Europe's data strategy for the European Union, and with which every organisation must comply.

The role of data intermediary is to guarantee the free-flowing circulation of data within the EU, while respecting the rights of data owners and competition laws between data owners and users. A neutral and trusted third party, the data intermediary creates the ability to create a balance in the data market between data owners, who are often SoHos/SMEs, and enterprises that will require that data to develop new services, such as AI software publishers, so typically larger companies. The aim then is to establish trust, ethics and transparency in the massive and secured circulation of data, while facilitating their monetisation.

### **Can you give some examples of data intermediation services and their benefits?**

The Data Intermediation Association, that we founded in late 2023, is made up of four data intermediation service providers: MiTrust, specialised in personal data sharing for different sectors (banking, insurance, real estate...); Agdatahub, dedicated to

agricultural and agrobusiness data; Hub One DataTrust, an airport data exchange platform; and Prometheus-X, for the education, training and employment sector.

What these four platforms have in common is that all are working to streamline and facilitate the circulation of qualified data, so that they can be monetised and used to benefit different groups.

For Agdatahub, data trading will help improve the tools that are useful to farmers and their economic and environmental performances. For Hub One DataTrust, it will help improve a range of services, from cleaning airports to car rentals, and enable airlines to be more punctual thanks to better traffic and incident management. With MiTrust, a complete housing rental agreement can be compiled and shared in a snap. Lastly, with Prometheus-X, the goal is to develop better quality education, training and employment services thanks to data sharing. In other words, data circulating to benefit humans, regardless of the sector of activity.

### **What does the Data Governance Act do for your activity? What are you expecting from this new regulatory framework?**

The Data Governance Act is legitimising years of work, that was often ahead of its time and running against the tide of Big Tech companies. It enshrines the fact that digital solutions users' consent over how their data are used is paramount. This is a "revolution" that is even more important than the GDPR was in its day, since the DGA concerns non-personal data, in other words those owned by organisations. This European data market, built around sector-specific data spaces, should galvanise data intermediation platforms and, above all, unleash innovation in every sector of activity. Innovation means improved working conditions, and savings on resources. It's a win-win situation.



## CLOUD, DATA AND AI: THE TRAJECTORY OF GENERATIVE AI COMPETITION DYNAMICS WILL BE LARGELY SHAPED BY COMPETITION CONDITIONS IN THE DIGITAL SECTOR

**Generative AI services** have been expanding at lightning speed, with the emergence of multiple players. The current race to innovate and drive the adoption of artificial intelligence services has created a momentum that will shape future competition dynamics for generative AI and digital services in general. This is why the development of a competitive and open market for generative AI appears vital to stimulate innovation.

In its response to the European Commission's public consultation on generative AI in March 2024<sup>1</sup>, Arcep stresses that the trajectory of **generative AI competition dynamics will be largely shaped by competition conditions in the digital sector as a whole**, at a time when incumbent Big Tech companies enjoy competitive advantages, particularly thanks to their cloud, data and technical expertise that are key resources for developing generative AI. Through their partnerships with model developers and their AI integration development platforms, **cloud computing companies** in particular appear to be essential intermediaries for facilitated access to generative AI services.

Leveraging **market power** over a specific digital ecosystem has already been observed in the past, so it is important to attenuate these risks and ensure that **key generative AI** resources remain accessible to new entrants, under fair and non-discriminatory conditions. This would help prevent a situation where a small handful of heavyweights enjoy privileged, if not exclusive, access to these key resources, thus creating an insurmountable barrier to entry for competitors, to the detriment of end users.

The Data Act and Digital Markets Act will play an important role in countering the power that certain players can exert. These two regulations impose several obligations – including access, portability and interoperability obligations – on players that own essential inputs such as data and cloud services. By creating a **new regulatory framework** that promotes competition and innovation in these markets and services that are upstream from or based on AI, these new obligations should attenuate the structural competitive advantages or those resulting from the ecosystemic nature of the targeted stakeholders, and prevent anticompetitive practices.

<sup>1</sup> ARCEP, 2024, [Arcep's contribution to the call for contributions on competition in generative AI](#)

## CHAPTER 7

# Implementing a European regulation of digital gatekeepers



## THE BOTTOM LINE

- After the regulation's adoption in September 2022, the obligations set forth in the **Digital Markets Act (DMA)** have been steadily implemented since 2 May 2023.
- On 6 September 2023, the Commission designated **six gatekeepers and 22 core platform services** they provide, under the DMA.
- Arcep represents BEREC within the **DMA High-Level Group**, and co-led the BEREC Opinion on the draft reference offer for WhatsApp interoperability.

## 1. THE DIGITAL MARKETS ACT: NEW REGULATION TO SUPERVISE THE INTERNET'S GATEKEEPERS

To make digital markets both fair and contestable, and to combat the dissemination of illicit or harmful content, and of illegal products, in 2022 the European Union adopted the **Digital Markets Act (DMA)** and the **Digital Services Act (DSA)**.

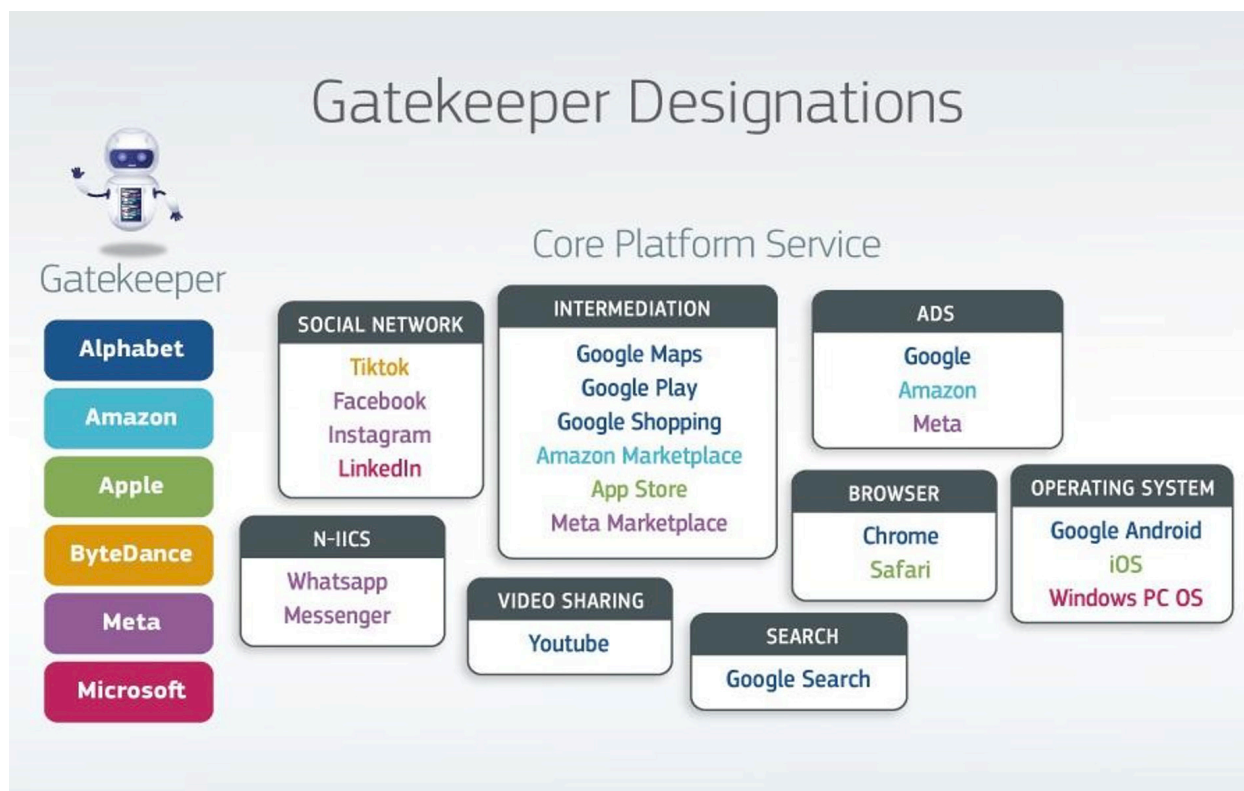
The DMA defines, ex ante, a series "do's and don'ts" with which companies and services qualified as "**gatekeepers**"<sup>1</sup> must comply. These are the large digital platforms that serve as major point of access between business users and end users. Some of them exercise strong influence on entire digital economy ecosystems.

2023 was marked by important stages in the implementation of this regulation. On 6 September 2023, the European Commission designated the first six gatekeepers: Alphabet, Amazon, Apple, ByteDance, Meta and Microsoft. **Twenty two of these gatekeepers' core platform services** were also designated, including WhatsApp, Android and iOS, YouTube, Chrome and Safari, Amazon Marketplace and *Google Search*.

These gatekeepers were given six months to comply with all of the obligations set forth in the DMA, for each of their designated gatekeeper platform services (see examples below). They have been subject to multiple **interoperability obligations** since 7 March 2024: they must, for instance, make their instant messaging service interoperable with competing services that so request, and ensure that their operating system is interoperable with third-party app stores.

<sup>1</sup> As defined in Articles 2 and 3 of the Digital Markets Act (DMA).





Source: [https://ec.europa.eu/commission/presscorner/detail/en/ip\\_23\\_4328](https://ec.europa.eu/commission/presscorner/detail/en/ip_23_4328)



### EXAMPLES OF OBLIGATIONS SET FORTH IN THE DMA FOR GATEKEEPERS:

#### + Gatekeepers will have to:

- Make it easy to cancel their core platform services;
- Make it easy to delete apps installed by default on devices, such as phones, computers or tablets;
- Ensure the interoperability of their instant messaging services (such as WhatsApp, Facebook Messenger) with competing services that so request;
- Allow their business users to promote their offer and conclude contracts with their customers outside the gatekeeper's platform.
- Allow business users to access their marketing and advertising performance data for the platforms;
- Notify the European Commission of all acquisitions or mergers.

#### - They will no longer be able to:

- Pre-install key software (web browsers, search engines, virtual assistants) by default when installing operating systems. Users must be given a multiple choice option to select competing services;
- Treat their own services or products more favourably than those of other businesses using their platform, or use other businesses' data to compete with them;
- Require app developers to use specific accessory services (such as payment systems).

Regarding **the interoperability of instant messaging services, Meta, as a designated gatekeeper**, was obligated to publish a reference offer before 7 March 2024, which sets out the technical details and general conditions governing interoperability with its instant messaging services<sup>2</sup>. Meta submitted a draft reference offer for WhatsApp to the Commission, which then requested an **opinion on it from BEREC** to determine whether its contents rendered Meta compliant with the interoperability obligation<sup>3</sup>. Arcep co-chaired the work involved in drafting this opinion.

In addition to the DMA, and to more effectively tackle the issues raised by key online platforms, European lawmakers also adopted a regulation aimed at digital services, aka the Digital Services Act (DSA). The DSA comes to replace the E-commerce Directive of 2000, and contains measures (e.g. the removal of illegal content,

transparency on content moderation, etc.) that apply to all online intermediaries offering their services in the European market: marketplaces, app stores, social media, but also ISPs, cloud service providers, etc. DSA rules are modulated according to the type of service and company size. Several members of BEREC (the Body of European Regulators for Electronic Communications) will be responsible for implementing the DSA at the national level. BEREC will organise a workshop in 2024 to give these NRAs an opportunity to discuss and coordinate their efforts around these shared challenges, notably in terms of aligning with the European Electronic Communications Code. In France, the regulatory Authority for audiovisual and digital communications (Arcom) is responsible for overseeing and enforcing the DSA, as the national coordinator for digital services.

<sup>2</sup> Article 7(4) of the DMA

<sup>3</sup> In accordance with recital 64 of the DMA

# Giving the floor to

## ROCH-OLIVIER MAISTRE

*Chairman of Arcom*



### WITH THE EU'S DIGITAL SERVICES ACT, ARCOM IS DEPLOYING A NEW REGULATORY MODEL BASED ON MAKING ONLINE PLATFORMS ACCOUNTABLE.

By building a single, harmonised digital space, the EU's Digital Services Act (DSA) opens a new chapter in supervising digital market players on our continent. The EU is the first to equip itself with a framework that both protects the public and upholds fundamental freedoms.

The DSA came into force in two stages: on 25 August 2023 for the very large platforms and search engines designated gatekeepers by the Commission – in other words those with more than 45 million users in Europe (i.e. now 23 services); and on 17 February 2024 for mid-size platforms, which include a wide array of entities: social media, video sharing platforms, marketplaces, search engines and travel or vacation rental platforms. The regulatory framework overhauls the intermediaries' limited liability system, while imposing new due diligence and transparency obligations on them. Gatekeepers are required to deploy a preventive approach to assess the systemic risks to which they expose their users, and must contract independent audits of their operations.

The implementation of this innovative regulation rests on the European Commission and a network of national digital service coordinators, who are part of an ad hoc

committee. In France, the law project on Safeguarding and regulating cyberspace, adopted by a Joint Committee on 26 March 2024, appoints Arcom as the implementation coordinator, alongside the General-Directorate for Competition Policy, Consumer Affairs and Fraud Prevention (DGCCRF), and the National Commission on Information technology and freedoms (CNIL).

Within this framework, the Authority is responsible for ensuring proper nationwide coordination between the competent authorities, and to carry out a mandate to monitor and analyse systemic risks. It has been given new investigative, enforcement and sanctioning powers over services established in France. For Arcom, this role also means designating trusted "watchdogs" whose reports will be given priority by the platforms, to ensure that members of civil society can have an active hand in regulation. The regulation also plans on opening access to very large online search engines and platforms to researchers who have been approved by the data access coordinator.

To implement this new mechanism, the Authority will be able to draw on its longstanding experience and the close relationships forged when carrying out

its earlier mandates to combat dis/misinformation and hate online, given by the laws of 2018, 2020 and 2021.

The regulation now gives Arcom the ability help supervise the means deployed by social media sites to combat illicit and harmful content, on the European scale, and working closely with its partners and counterparts.

Arcom is actively preparing for these newfound responsibilities: a cooperation agreement was signed in 2023 with the European Commission to ensure more fluid information and analysis sharing, for more effective supervision of gatekeeper platforms. Ties with CNIL, DGCCRF and our main European counterparts have been formalised, regulatory teams reinforced and operational means, particularly in the area of information sharing, have been adapted to the task.

The conflict in the Middle East, and its repercussions on our continent, European elections, but also the 2024 Olympic and Paralympic games in Paris are already providing concrete opportunities to implement the regulation's measures into effect in a concrete fashion, to provide European citizens a safe, secure and trustworthy digital space.

## 2. INTEROPERABILITY OF INSTANT MESSAGING SERVICES, A PRO-CONSUMER TOOL: LEGAL OBLIGATIONS AND BEREC'S WORK

Arcep and BEREC play an important role in the application of instant messaging services' interoperability obligations set out in the DMA.

The DMA requires gatekeepers providing instant messaging services<sup>4</sup> to ensure, for free and on request, their interoperability with certain basic functions of these services<sup>5</sup>. To facilitate the practical implementation of this interoperability, the gatekeeper in question must publish a reference offer that stipulates the technical details and general conditions for interoperability with its services. The **European Electronic Communications Code (EECC)** also contains interoperability measures to ensure end-to-end connectivity for number-independent interpersonal communications services<sup>6</sup>.

In June 2023, BEREC published a [report](#) that lays out the main economic characteristics and current status of the market for **instant messaging services**. It also analyses the objectives, scope and conditions of application of interoperability obligations under the DMA and EECC, potential technical approaches and implementation challenges.



↑ Chiara Caccinelli, Deputy Head of Unit of Arcep's "Economic analysis and digital intelligence" unit, and co-chair of BEREC's "Digital markets" experts group, at the "DMA & Messaging Services Interoperability - Legal framework of article 7, trade-off & challenges" hosted by the European Commission on 27 February 2023.

Drawing on its well-established **experience in the interoperability of electronic communications networks**, BEREC also provided a list of essential elements that needed to be in a gatekeeper's reference offer, in accordance with the DMA. They include service level agreements and guarantees, key performance indicators (including threshold values), along with other relevant technical information.



### HOW TO IMPLEMENT THE INTEROPERABILITY OF INSTANT MESSAGING APPS SET FORTH IN EUROPEAN REGULATIONS?

Two options:

- 1 Gatekeepers can develop and provide access to their own technical solutions, such as application programming interfaces (APIs) or bridges.
  - + Pro: APIs can facilitate more dynamic and rapid adjustments than standardised solutions.
  - Con: interfaces are designed by the gatekeepers and specific to the company that provides them, which means they are likely to differ from third-party providers<sup>1</sup>.

- 2 Solutions can be developed through a standardisation process.
  - + Pro: standards are often defined through a process that involves multiple stakeholders.
  - Con: the process can be time consuming.

In addition to the choice between these two options, BEREC stresses the fact that it is crucial to define an appropriate update mechanism, making it possible to add new features, quickly remedy security flaws, and to give market players enough lead time to adapt.

**To find out more:** BEREC, [Report on the interoperability of NI-ICS, 2023](#)

4 And, more broadly, number-independent interpersonal communication services

5 Article 7 of the DMA

6 Article 61(2) of the CECE

Arcep is contributing actively to the implementation of these obligations. It co-chairs the BEREC experts group in charge of this work, and has represented BEREC on multiple occasions at technical workshops the Commission hosted on this subject<sup>7</sup>. The latest was on 1 February 2024 and was attended by Meta, its potential competitors and BEREC, to discuss the technical aspects of implementing the interoperability of WhatsApp.

Lastly, on 29 January 2024, the Commission requested that BEREC assess Meta's draft reference offer for the interoperability of WhatsApp. Arcep co-led the preparation of the [BEREC Opinion](#) on the draft reference offer, which it submitted to the Commission on 15 February 2024. This opinion underscores the need for

additional technical details on the interfaces and standards to make WhatsApp truly interoperable, to clarify the quality of service level and establish key indicators to enable the Commission and Meta competitors to monitor the actual implementation of the conditions.

BEREC also concluded that – although the DMA does not stipulate such a mechanism – it would be advisable to include a tool in the reference offer for settling disputes between Meta and its competitors. This mechanism could draw inspiration from existing mechanisms used for telecoms regulation. Lastly, BEREC concluded that the Meta proposal's compliance with Article 7 of the DMA needed to be assessed according to its veritable capacity to achieve the goal of a contestable instant messaging market.



### EXCERPT FROM ARCEP'S *THE POST* NEWSLETTER: PASS IT ALONG!

#### « What would an obligation of interoperability mean for social media?

In a document that endeavours to explain the basic notion of an Open Internet, the publication “La Quadrature du Net” imagined the social and commercial consequences of imposing an [obligation of interoperability on social media platforms](#). Interoperability means different systems having the ability to “talk” to each other, thanks to their compliance with shared rules. This is the principle that enables us, for instance, to communicate via e-mail without using the same messaging software. But most companies today rely on proprietary protocols that render their users captive to their services, and particularly social media companies and instant messaging service providers such as Facebook or Apple. So “La Quadrature” thought about how a regulator could dismantle these powerful “network effects” thanks to interoperability, to liberate users and unleash freedom of expression.

#### 59 proposals from the independent press to provide the “États généraux de l’information” with food for thought

Last October, the Elysée launched the “États généraux de l’information” (EGI) Forum on information and communication as a way to foster solutions to the many crises that the print media sector is grappling with. The EGI Steering Committee has been gathering feedback from stakeholders and print media readers to help inform its work. It also held a hearing with Arcep Chair, Laure de La Raudière, in [early January](#) to tap into the press distribution regulator’s experience. At the same time, 100 independent media outlets, associations and press unions held an evening-long Independent Press Forum (“États généraux de la presse indépendante”). During this meeting, [59 proposals were made](#), aimed at fighting media industry concentration and the increasing precarity of the journalistic profession, strengthening the right to information and news media rights, and better distributing public aid for print media, and thereby giving food for thought to the General States of Information Forum on information and communication. »

<sup>7</sup> The first was held on 27 February 2023, a recording of which is available on the European Commission’s [website](#). Participation at the second workshop was for the affected platforms and BEREC.

# Giving the floor to

## FLORENT LAFAY

*Doctor of Law*



### INTEROPERABILITY: FROM OPEN NETWORKS TO OPEN ICT

**The historic opening of networks and the internet has come to a halt, even though there is still some way to go: promoting interoperability would mean opening digital ecosystems to guarantee freedoms.**

Since the 1960s in the United States<sup>1</sup> and the 1980s in Europe<sup>2</sup>, public authorities began opening electronic communications networks to competition, defining the conditions for guaranteeing equal access to infrastructures. Their steady involvement led to a gradual opening of:

- Networks to devices, ensuring the development of the first IT networks by giving users the ability to connect modems;
- Networks to services provided by competitors. Without regulatory intervention, it is unlikely that carriers that enjoyed a monopoly would have allowed the internet to prosper, as it was a decentralised network that threatened the ecosystem they controlled;
- Networks to interconnection to other physical and logical networks;
- The internet as such, guaranteeing users' freedom to access and distribute content, services and applications without discrimination.

Up until recently, regulatory intervention had nevertheless been confined to physical and logical networks, allowing the emergence of a handful of closed ecosystems on the internet that are dominated by today's gatekeepers. These large corporations have the power to control how digital infrastructure evolves, and to stifle competition and innovation. From a societal standpoint, they determine the terms and conditions under which users are able to exercise their freedom of expression and to access information, their freedom of enterprise, freedom of association and assembly, and their right to privacy.

Faced with these problems, some have argued for Big Tech conglomerates to be dismantled. Although this option should not be entirely dismissed, a more proportionate remedy must be considered first. This remedy is interoperability, in other words the capacity for multiple systems (e.g. social media, messaging services, operating systems, cloud computing services) to exchange information freely to be able to function together. In regulators' hands, interoperability becomes a powerful tool for framing the ability to monitor Big Tech.

Interoperability has the potential to unfetter digital ecosystems, in the same way that interconnection opened up the networks. Partially present in some European regulation (e.g. the Digital Markets Act and Data Act), an obligation of interoperability could be made systematic to ensure equal access to platforms such as Apple's iOS, enabling users of competing services, notably of social networks like Instagram, to communicate with one another, and to hand users back control over their data. The promotion of interoperability should also play a central role in the development of virtual worlds. Taking early action would prevent a concentration in this market akin to the one that exists with online platforms.

Used as a regulatory tool, interoperability embodies the goal of safeguarding users' freedom of choice, competition and innovation, through the decentralisation of digital ecosystems. It also helps to strengthen users' autonomy in managing their online rights and freedoms. Verily, it can give users the ability to choose services whose moderation and confidentiality policies respect their rights more fully, while allowing them to maintain ties with their community.

<sup>1</sup> FCC, 13 F.C.C.2d 420 (1968), Carterfone decision

<sup>2</sup> Directive 88/301/EEC (1988), aka Devices Directive

## CHAPTER 8

# Is artificial intelligence the new internet gateway?



## THE BOTTOM LINE:

- After close to three years of discussions across the EU, the European Parliament adopted the regulation on artificial intelligence in March 2024, and by the Council in May 2024. The **AI Act** introduces a legal framework for assessing and minimising the risks posed by the different AI systems.
- The use of generative AI exploded in 2023. It is emerging as a **gateway for accessing online content** by becoming a new interface that is likely to replace certain traditional digital services (search engines, platforms, sites).
- In early 2024, Arcep presented its initial analysis of generative AI and particularly its impact on an open internet and sustainability, in response to the **European Commission's public consultation** on the subject.

If there is one topic that dominated public discussions about digital technology in 2023 it was artificial intelligence (AI), and **generative AI** in particular. Generative AI systems can be characterised by their ability to generate and publish new data (images, text, audio, etc.). Unlike “conventional” AI systems, which are confined to classification and prediction, generative AI can produce new outcomes, typically by employing **deep learning models** or neural networks. It thus operates based on assimilating and synthesising models obtained from a training corpus, then reproducing these learned patterns to generate new data.

Generative AI underwent a swift uptake in adoption in late 2022. One prime example, ChatGPT logged 100 million unique users in 2 months (to compare, it took Tik Tok almost 9 months and Instagram two and a half years to reach a similar number of users). **The possible technological, societal, economic and social impacts of this technology continue to be the subject of studies and workstreams at both the national and European level, and in which Arcep wanted to participate.**

By implementing European **regulation on artificial intelligence**, the European Union<sup>1</sup> is addressing certain shared concerns about the different AI technologies, in particular by instituting a system

of AI risk-prevention for the different artificial intelligence systems, including generative AI, which draw heavily on national works – e.g. on personal data protection<sup>2</sup>. In March 2024, **the Generative AI Committee submitted a report to the President of France**, along with recommendations for enabling France to capitalise on the revolution being ushered in by these technologies: in terms of teaching, training, investment and competitiveness<sup>3</sup>, The Competition Authority is also working on the competitive dynamics of the generative AI sector<sup>4</sup>.

As an adjunct to these endeavours, Arcep is focusing its investigations **on the consequences of AI's potential role as a new internet gateway**. From the user standpoint, generative AI systems could become a new way to access online content. A recent study from Gartner, for instance, forecasts a 25% decrease in the volume of search engine requests by 2026 due to the development of chatbots using generative AI<sup>5</sup>. The latter's role as an “intelligent” interface would change how users access their content, and could raise questions about the internet's openness. The European Declaration of digital rights and principles recognises the principle **of a neutral and open internet**, as well as **citizens' freedom of choice** with respect to AI algorithms.<sup>6</sup>

1 More information can be found on the regulation concerning artificial intelligence on the [European Commission's website](#).

2 [CNIL website](#)

3 Commission on Artificial Intelligence, “[AI: Our Ambition for France](#),” March 2024.

4 On February 8, 2024, the Competition Authority decided to self-refer for an opinion on the competitive functioning of the generative AI sector and to launch a public consultation. More information [on its website](#).

5 Gartner press release, February 19, 2024, “[Gartner Predicts Search Engine Volume Will Drop 25% by 2026. Due to AI Chatbots and Other Virtual Agents](#).”

6 [European Declaration on Digital Rights and Principles](#), 2022.

## 1. ARTIFICIAL INTELLIGENCE, A CENTRAL FOCUS OF THE ARCEP'S REFLEXIONS ON THE FUTURE OF THE INTERNET

Arcep's particular interest in the question of how generative AI might affect an open internet is entirely in keeping with its earlier work.

Back in 2018, Arcep's report on "*Smartphones, tablets, voice assistants... Devices, the weak links in achieving an Open Internet*"<sup>7</sup> invited readers to ponder the ways in which AI systems built into user devices or voice assistants will affect the internet's openness.

Arcep then focused specifically on **AI's impact in the electronic communications sector**, as part of its forward-looking analysis exercise on "Future networks". In 2020, it published a memo on "artificial intelligence in electronic communication networks" analysing AI's role in the networks and possible regulatory issues, for instance in the area of Net neutrality.

In light of AI's growing presence, Arcep wanted to understand its particular effects on networks and the internet ecosystem. It organised **a series of interviews and in-house workshops**, talking to IT, economics and legal researchers specialising in these new technologies.



↑ Photo of Arcep in-house seminar on AI's ethical and legal challenges, on 1 December 2023. Left to right: Anne Lenfant (Arcep), Ronan Pons CNRS engineer and PhD in AI-related law (Université de Toulouse – University of Ottawa), Karën Fort, lecturer in natural language processing (Université La Sorbonne) and Anaël Bourrous (Arcep).

Arcep also became involved in European discussions on the subject, as part of the negotiations surrounding the AI Act. By contributing to BEREC's work, which led to the production of a report in 2022 on the challenges that AI poses for Europe's electronic communications and sectoral regulators, as well as a position in 2024 on the issues surrounding AI in terms of competition, openness and its environmental footprint.



### ARTIFICIAL INTELLIGENCE REGULATION, A RISK-CENTRIC APPROACH

The European Union's AI Act – adopted by the European Parliament and Council in early 2024 – can be characterised by its **risk-centric approach**. Depending on the level of risk they represent, AI systems are subject to different obligations. The new regulatory framework thus draws a distinction between:

- **AI systems that pose unacceptable risks, and are banned** due to the excessively high risks they represent (e.g. social scoring systems, systems that manipulate human behaviour, or biometric categorisation systems based on sensitive characteristics);
- **High-risk AI systems** (e.g. systems used in areas such as critical infrastructure management and operation, or education and training) which are subject to more stringent requirements, data quality obligations, cybersecurity requirements, etc.);
- **Minimal or low-risk AI systems** (e.g. AI systems that generate content) which can be subject to transparency obligations and voluntary codes of conduct (similar to the regulation's provisions for high risk AI systems);
- Lastly, **general purpose AI systems** (including generative AI) with a specific framework.

Absent from the regulation's initial proposal, obligations pertaining to generative AI were subsequently added on the initiative of the European Parliament. In the current regulation, "general purpose" AI models – defined as being capable of executing a wide range of different tasks, and able to be integrated into a variety of systems and applications – are subject to a strict set of risk-based rules. Obligations such as copyright compliance, transparency, information, cybersecurity requirements, depend on the level of risk that the general purpose AI model poses.

The AI Act was adopted in 2024, and most of these provisions will come into force in 24 months. Those pertaining to prohibited AI systems and general purpose AI models are expected to be applied sooner. A structure of shared governance between national authorities and European bodies, such as the European AI Office, which is in charge of implementing the provisions set forth for general purpose AI models, will be set up to monitor the market and ensure the regulation's application.

7 ARCEP, *Smartphones, tablets, voice assistants... Devices the weak link in achieving an Open Internet*, 2018.



# Giving the floor to

## MARIE-LAURE DENIS

*Chair of French data protection authority, CNIL*



### **“THE SUCCESS OF AI DEPENDS ON ITS DEVELOPMENT IN ACCORDANCE WITH FRENCH AND EUROPEAN FUNDAMENTAL RIGHTS AND FREEDOMS.”**

For more than 45 years, CNIL has been adapting to technological innovations, to reconcile changing practices and protecting people. Our institution, born at the dawn of centralised computing systems in the 1970s, was then faced with computing in the workplace (1980), the advent of home computers (1990), their networking via the Internet (2000) then the proliferation of connected devices, notably smartphones, and the exponential increase in data traffic (2010). Today, even if other major developments need to be taken into account (Web3, quantum computing, etc.), the rise AI, and especially generative AI, crystallises all of the questionings.

2022 was marked by a new acceleration in the deployment and use of AI systems by the public at large, accessing text and image-generating AI software delivering unprecedented performances. Since then, CNIL has observed an acceleration in the desire to adopt these technologies, and this in all sectors of activity: health, public services, public safety and homeland security, etc.

Parallel to these technological and uses changes, over the past five years Europe

has decided to adopt and implement a series of regulations that directly affect the digital ecosystem, and AI in particular. To ensure that these regulations do not weigh too heavily on innovative players, it is vital to ensure that their application is monitored and well guided.

This is why, aware that, for France, the adoption of this technology is a major factor in its ability to compete, to innovate and safeguard its sovereignty for the coming years, CNIL committed to clarifying the legal framework that applies to players that design and deploy AI systems that use personal data. To this end, it created a dedicated department, and structured its work around four pillars:

- understand how AI systems work and their impact on people, to define tailor-made rules;
- guide the development of AI that respects privacy, by clarifying the applicable legal framework, based on concrete use cases;
- federate and support innovative AI companies in France and in Europe to provide them with access to the regulator and to its answers;

audit AI systems and protect people, to ensure efficient and appropriate oversight.

Over the course of the past year, several concrete actions have been implemented: bespoke support for innovative companies and projects (“AI for the public service” sandbox; “increased support” mechanism), crafting recommendations on AI systems development, webinars for industry professionals, audits of machine vision systems, for the security of the 2024 Olympic and Paralympic Games.

Starting in July 2024, the EU’s new AI Act will come into force, and will define a dedicated framework for the design of high-risk AI systems and their placement on the European market. This framework seeks to guarantee AI that protects fundamental rights and users’ safety and security, and will be linked to other regulations, including the GDPR. Drawing on its increased expertise in AI, CNIL will naturally contribute to the supervision of these high-risk AI systems that carry crucial issues for our fellow citizens.

While the AI Act is focused on the risks that artificial intelligence poses in terms of personal data, compliance and ethics, **Arcep has trained its sights on generative AI's impact on an open internet**, and on the **issues surrounding** this market's competition dynamic and **environmental sustainability**.

To this end, the Arcep Chair was queried on the topic of generative AI on 15 June 2023, by French National Assembly Deputies who are members of the Task Force on the challenges of generative AI, regarding personal data protection and use of the generated content. Laure de la Raudière also spoke about Arcep's views on generative AI and its impact on the information space, **at a hearing during the "États généraux de l'information" (EGI) Forum on information and communication on 8 January 2024**. Among other things, she stressed that if services based on generative AI develop and are more widely adopted, by becoming internet interfaces, *"general purpose generative AI (e.g. ChatGPT) could become the new gateways to the internet and online information"*.

The Authority had an opportunity to present its initial discussion points in response to the European Commission's public **consultation on generative AI**<sup>8</sup>, launched in January 2024. In particular, the Authority is exploring how generative AI will affect the openness of the internet ecosystem (see next section); as well as generative AI market dynamics (see) and the issues and challenges surrounding these technologies' environmental footprint, addressed in this report's Chapter on "Promoting the ecodesign of digital services".



↑ Photo of Arcep at the "États généraux de l'information" (EGI) Forum on information and communication Steering Committee meeting on 8 January 2024. From left to right: Cécile Dubarry (Director-General of Arcep), Laure de la Raudière (Arcep Chair) and Rodolphe Le Ruyet (Advisor to the Arcep Chair).

## 2. GENERATIVE AI'S IMPACT ON THE INTERNET ECOSYSTEM

**Generative AI is a major catalyst for innovation on the internet.**

Thanks to its applications, it has never been easier to produce a text, an image or lines of code. Generative AI thus constitutes a new building block in the internet ecosystem that has the potential to redefine digital practices by becoming a new gateway for accessing content on the Web.

### 2.1. Generative AI, a new internet gateway for users

In terms of practices, the current momentum tends to indicate that **users are replacing conventional services used to access content** (search engines, content sharing platforms) with future applications based on or enhanced by generative AI. Aside from chatbots, generative AI systems are being used more and more by traditional digital services, including the most common ones such as search engines (integration of GPT-4 into Bing, the Google Gemini chatbot, generative AI assistant incorporated into DuckDuckGo<sup>9</sup>), social media (e.g. the "Meta AI"<sup>10</sup> project, Grok, the AI chatbot incorporated into X (formerly Twitter<sup>11</sup>), and connected devices (e.g. the Alexa<sup>12</sup> voice assistant on Amazon devices, the Google voice assistant that uses Gemini<sup>13</sup>).

<sup>8</sup> Arcep's contribution to the call for contributions on competition in generative AI, 2024.

<sup>9</sup> DuckDuckGo Blog, March 8, 2023: '[DuckDuckGo launches DuckAssist: a new feature that generates natural language answers to search queries using Wikipedia.](#)'

<sup>10</sup> Nicolas Lellouche, September 27, 2023: '[Imaginary friends resembling celebrities: Facebook's project.](#)' Numerama.

<sup>11</sup> Le Monde/AFP, March 11, 2024: '[Artificial Intelligence: Elon Musk announces the open access release of the chatbot Grok from his start-up xAI.](#)'

<sup>12</sup> Le Figaro/AFP, September 21, 2023: '[Amazon adds generative AI to its voice assistant Alexa.](#)'

<sup>13</sup> Google Blog, October 4, 2023: '[Assistant with Bard: A step toward a more personal assistant.](#)'

Although B2C generative AI applications are no doubt the most visible, there are also multiple business use cases that employ generative AI as a **new Human-to-machine interface** to perform a range of tasks (admin, technical expertise, assistance with decision-making, etc.).

All of these examples point to the **foothold that generative AI providers are gaining in the value chain for accessing online content**.

## 2.2. The possible risks that generative AI poses to an open internet

Generative AI's influential role in accessing content could create challenges when seeking to safeguard the principle of an **open internet**, which European law defines as the *“right to access and distribute information and content, use and provide applications and services, and use terminal equipment of their choice(..)”*<sup>14</sup>.

The leading generative AI providers enjoy a growing influence over the conditions under which content is presented to users. Generative AI has the power to accentuate **the risks of locking users in and algorithmic bias**, as users lose control over their online choices, and having to submit to a new intermediary. Generative AI is based on very powerful algorithmic systems, but which still have trouble explaining what guides their recommendations, including the sources they use. Although they have a number of problems in common with other digital services based on algorithms, generative AI technologies stand out from content providers' other applications as their aim is not to provide a way to share, produce or access users' content, but rather for

the providers to generate *ad hoc* content. The training corpus, configuration and algorithmic choices defined by **“gatekeeper” content generators** could bias and restrict the information that users are able to access on the internet.

Moreover, **traditional content providers'** (both media and digital commons models like “Wikipedia”) business model and their ability to make content available to users could be challenged by generative AI. These traditional content providers would thus be forced to sign agreements with **generative AI providers in order to reach users**. At a time when only a handful of players dominate the generative AI market, it is by no means certain that free competition will suffice to guarantee a normalisation of the relationships between generative AI providers and traditional content providers, since gatekeeper content generators could lock in users and lock out content providers that have neither the desire nor the financial capacity to sign an agreement with the dominant players. The generative AI sector's heavyweights are in fact already signing contracts with leading national media companies to normalise their relations. Examples include the recent agreements between Open AI and Germany's Axel Springer and with Le Monde in 2024.

Some of the **risks of locking in users** that Arcep had already identified with traditional platforms (search engines, social media and operating systems), generative AI could **amplify** and multiply since it is no longer a matter of a provider offering users a third party's content, but rather of generating their own content, without having to be transparent about their sources, the subjectivity or reliability of the information they deliver<sup>15</sup>.

### OPEN INTERNET AND GENERATIVE AI: WHY DOES IT MATTER?

Imagine: you go, as you do every day, to your local news-agent to buy your favourite newspaper. This morning, he offers to give you his own summary of the latest news instead, claiming to have read every newspaper and magazine from around the world. How is he getting his news, and is he capable of recognising fake news and disinformation? What are his ideological biases, and how much can you trust his summary? These are all of the potential issues that generative AI could create if it were to replace our search engines, websites and traditional media as the unavoidable gateway to accessing content and information.



<sup>14</sup> European Union Regulation 2015/2021/EC. Laying down measures concerning Open Internet Access

<sup>15</sup> In an article published in 2024, Emily Bender and Chirag Shah analyse the impact that information search tools using Large-Language Models (LLM) have on information search practices and the Web as an informational ecosystem: Shah and Bender, February 2024, “Envisioning Information Access Systems: What Makes for Good Tools and a Healthy Web?” ACM Trans. Web Just Accepted

### 3. AVENUES FOR REFLECTION ON HOW TO COMBINE GENERATIVE AI AND AN OPEN INTERNET

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To inform future deliberations about generative AI, in its response to the European Commission's public consultation, Arcep laid out avenues for reflection<sup>16</sup> to ensure that the role that generative AI plays on the internet does not contravene the application of the principle of an open internet – the goal being to ensure that this “network of networks” remains a rich and plural space where innovation can thrive.

In particular, Arcep's contribution calls for the **promotion of reliable and transparent generative AI**, that will make a positive contribution to the wealth of content made available to users on the Web. This means, for instance, encouraging providers to develop reliable, unbiased AI systems, and supporting evaluation and correction work developed by research. While users often unknowingly participate in helping AI function, especially its training, Arcep also stresses the need to promote **more informed use** of AI through the teaching of and transparency on the models' performance and how data are used.

The Authority also raises the potential issues surrounding “gatekeeper” content providers' dominance over access to online information. It points to existing tools to prevent them from **collecting data**, and the definition of common **rules and standards for agreements between content providers and content generators**. Arcep's contribution goes on to underscore how important is to guarantee users' ability to switch “content generators,” notably by assessing their compliance with existing data portability measures, in addition to defining and using interoperability **standards** for the main content generators.

These reflections make up an initial set of factors for analysis will fuel **Arcep's future work** on generative AI and beyond, in collaboration with other regulators, ecosystem stakeholders and civil society, which will be vital to crafting collective rules for safeguarding an enduringly **open, desirable and sustainable internet**.

<sup>16</sup> For more details on these factors to consider, read Arcep's full contribution (in French) from 2024: [Arcep's response to the call for contributions on competition in generative AI](#)

# Giving the floor to

## FRÉDÉRIC ALEXANDRE

*Director of Research,  
Mnemosyne Project team leader at Inria*



### TRAINING CITIZENS TO ACHIEVE MORE INFORMED USE OF GENERATIVE AI!

If Artificial intelligence (AI) has taken centre stage, and continues to permeate all corners of society (home, work, education), this is in large part due to its generative form, capable of generating content, such as text (ChatGPT) and images (Midjourney). There are two main reasons for this massive dissemination: generative AI software has made tremendous strides of late, and is now accessible to the masses.

A conversational agent, like ChatGPT is based on a deep learning model (a transformer) that is trained by massive quantities of text (billions of words), and then forced to represent in its inner layers statistics on the most frequently encountered words in these texts. This is how we obtain a large language model whose main function, when fed the beginning of a sentence, is to predict what is most likely to come next. This first stage, whose originality lies primarily in the scale of the training phase, is completed by a learning phase (performed in part by humans) which consists of teaching the chatbot to use this language model to answer the questions it is asked. The user is also involved, as the way to ask questions (art of prompting) is now largely ingrained.

Aside from the quality of the output that can be obtained, the success of these techniques also lies in their user friendliness. A person does not have to be a computer or statistics whiz to use this type of AI: they only need to talk to the chatbot as they would another person. But this very intuitive aspect is often also the problem: we forget the product's purely mechanical and statistical nature, and we think that "the one" talking to us thinks and reasons the way we do, which creates significant risks, which itself is a huge argument in favour of teaching laypeople about the issues inherent in these generative AI systems.

Several topics can be addressed during these awareness-raising sessions. The first step is to dismantle the illusions created by this intuitive use: the chatbot talking to us is only a large language model (sometimes called a stochastic parrot) whose main function is to predict the next most likely word, and which therefore has no understanding (nor intentionality, nor feeling) about what it produces. By the same token, this same outcome could be qualified as plausible (since it is based on a statistical analysis of texts produced by humans) but certainly not

truthful. This is why we are able to observe the production of hallucinations (here again, analogous with human psychology) when an incoherent response from the model is presented to us as fact.

A number of other facts need to be pointed out, in addition to these caveats: massive learning requires (financial and technical) means that only US Big Tech companies can afford, which can create sovereignty and dependency issues, not to mention the environmental impact of these models. This second learning phase is equally opaque, and thus subject to these same Big Tech companies' implicit preferences.

For all of these reasons, but also because it is often hard to distinguish these automated bots from learning bots, it is important to introduce an initiation to these tools into our education system, to learn how to use them intelligently. We also need to work to ensure safer use of these tools in the workplace, particularly in terms of data protection (lighter and more autonomous versions are emerging), and to regulate their use in terms of intellectual property, or merely transparency.

# Giving the floor to

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### AI: OUR CAPACITY BUILDING BEGINS WITH DATA COLLECTION

The overarching aim of Europe's AI Act is to ensure the security of AI systems and to control the risks associated with their use. Now that these first building blocks are in place, a great deal more work needs to be done in terms of implementation. While a number of doors are open, others still need to be opened. Thanks to negotiations, environmental imperatives have been written into the regulation. Given the very high energy and mineral consumption and CO2 emissions figures cited here and there, there is good reason to call for regulatory intervention. Not to regulate or block access to the market as yet, but rather to collect the data needed to better understand past, present and future consumption patterns.

Arcep and ADEME's joint action on digital technology's environmental footprint clearly shows the extent to which a common set of data and a shared understanding are vital to properly steer public debate and action. It is this detailed investigative work, based in part on collecting data from digital industry stakeholders, which substantiates why more or fewer obligations are imposed on this or that category of player. In accordance with and in preparation for the AI

Act's entry into force, it would be entirely possible, and even especially useful, to begin immediately this work of collecting environmental information from generative AI companies. French Law seems to allow it. Let us send a questionnaire to all of the companies involved! We will then be able to decide what place this or that type of AI has in our markets.

Among the risks that we still need to formulate and fully understand is a new wave of intermediation that chatbots could grab for themselves. At this stage, any future predictions need to remain in the conditional tense. Despite which, we need to imagine that, in the not too distant future, access to information, to our goods and products, will go through chatbots, at least in part. These are the future scenarios being presented by Bill Gates, OpenAI, Rabbit, Perplexity, etc. But how can we ensure that this new intermediation is not tantamount to creating a new monopoly? If we look at the agreements signed between leading press companies and the generative AI market's current dominant player, one may be permitted to wonder about the conditions shaping its rivals' access to the same content. This

may also apply to the data resources that make up the different social networks. But the question will also be raised for every strand of the daily economy.

Might it be necessary to impose a principle of full openness, promoting the interconnection of every player? Do we need to think of imposing a principle of reasonable and non-discriminatory access, including from a pricing standpoint? Before stipulating any principles that will govern relations between content providers and AI models, we need to fine tune our understanding of the situation. Which, once again, is only possible by activating the public and independent work of collecting information from the concerned stakeholders.

Whether for the sake of environmental protection or an open economy, this shared and objective understanding will put us in a position to act. Whether we are a regulator, a content creator, innovator or consumer, we need the most relevant information to then be able to propose, choose, configure or obligate. It is based on this information that we will be able to inform a democratic debate, that will lay the groundwork for future regulation.



# Lexicon

## **Afnic (Association française pour le nommage internet en coopération)**

France's domain name registry. A non-profit organisation (under France's law of 1901) whose mandate is to manage top-level domain names in France (.fr), Reunion (.re), France's southern and Antarctic territories (.tf), Mayotte (.yt), Saint-Pierre-et-Miquelon (.pm) and Wallis-et-Futuna (.wf).

## **API (Application Programming Interface)**

Application Programming Interface that enables two systems to interoperate and talk to one another without having been initially designed for that purpose. More specifically, a standardised set of classes, methods or functions through which a software programme provides services to other software.

## **NRA (National Regulatory Authority)**

an organism or organisms that a BEREC Member State mandates to regulate electronic communications.

## **BEREC (Body of European Regulators for Electronic Communications)**

independent European body created by the Council of the European Union and the European Parliament, and which assembles the electronic communications regulators from the 27 European Union Member States.

## **CDN (Content Delivery Network)**

Internet Content Delivery Network.

## **On-net CDN**

CDN located directly in an ISP's network.

## **Codec**

a device or computer program that encodes or decodes a digital data stream, for transmission or storage purposes.

## **Cross-traffic**

the traffic generated during a QoS and/or QoE test by an application other than the one being used to perform the test, either on the same device or on another device connected to the same box. Cross-traffic decreases the bandwidth available for the test.

## **Speed**

Also referred to as throughput. Quantity of digital data transmitted within a set period of time. Connection speeds or bitrates, are often expressed in bits per second (bit/s) and its multiples: Mbit/s, Gbit/s, Tbit/s, etc. It is useful to draw a distinction between the speed at which data can be:

- received by a piece of terminal equipment connected to the internet, such as when watching a video online or loading a web page. This is referred to as download or downlink speed;
- sent from a computer, phone or any other piece of terminal equipment connected to the internet, such as when sending photos to an online printing site. This is referred to as upload or uplink speed.

## **DNS (Domain Name System)**

mechanism for translating internet domain names into IP addresses.

## **Dual stack**

assigning both an IPv4 address and an IPv6 address to a device on the network.

## **ISP**

Internet Service Provider.

## **CAP**

content (web pages, blogs, videos) and/or application (search engine, VoIP applications) providers.

## **Ftth (Fiber to the Home) network**

very high-speed electronic communications network, where fibre is pulled right into the customer's premises.

## **HTTP (Hypertext Transfer Protocol)**

client-server communication protocol developed for the World Wide Web.

**HTTPS: HTTP Secured thanks to the use of SSL (secure socket layer) or TLS (transport layer security) protocols.**

## **iOS**

mobile operating system developed by Apple for its mobile devices.

## **IP (Internet Protocol)**

communication protocol that enables a single addressing service for any device used on the internet. IPv4 (IP version 4) is the protocol that has been used since 1983. IPv6 (IP version 6) is its successor.

## **IPv6-enabled**

device or connection that actually transmits and receives traffic using IPv6 routing, either thanks to activation by the customer or activation performed by the operator.

## **IPv6-ready**

device or connection that is compatible with IPv6, but on which IPv6 is not necessarily activated by default.

## **IXP (Internet Exchange Point), or GIX (Global Internet Exchange)**

physical infrastructure enabling the ISPs and CAPs connected to it to exchange internet traffic between their networks thanks to public peering agreements.

## **NAT**

Network Address Translation mechanism for remapping one IP address space to another, used in particular to limit the number of public IPv4 addresses being used.

## **OS (Operating System)**

software that runs a peripheral device, such as Windows, Mac OS, Linux, Android or iOS.

## **Peering**

the process of exchanging internet traffic between two peers. A peering link can be either free or paid (for the peer that sends more traffic than the other peer). Peering can be public, when performed at an IXP (Internet Exchange Point), or private when over a PNI (Private Network Interconnect), in other words a direct interconnection between two operators.

## **Network termination point**

the physical location at which a user gains access to public electronic communications networks.

**QoS (Quality of Service):** in Chapter 1, quality of service on the internet as measured by “technical” indicators such as download or upload speed, latency and jitter. The term QoS is often used to refer to both technical quality and quality of experience (QoE).

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**RFC (Request For Comments):** official memorandum that describes the technical aspects and specifications that apply to the working of the internet or to different computer hardware.

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**Specialised service:** electronic communication service(s) that are distinct from internet access services, and which require specific quality of service levels.

**Autonomous Systems:** a collection of networks managed by the same administrative entity, having relatively homogeneous routing protocols.

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**Web tester:** tool for measuring QoS and QoE which is accessed through a website.

**TLS (Transport Layer Security):** used for encrypting internet exchanges and server authentication.

**Transit provider:** company that provides transit services.

**Transit:** Bandwidth that one operator sells to a client operator, providing access to the entire internet as part of paid, contractual service.

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**UDP (User Datagram Protocol):** simple, connectionless (i.e. no prior communication required) transmission protocol, which makes it possible to transmit small quantities of data rapidly. The UDP protocol is used on top of IPv4 or IPv6.

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**VoIP (Voice over IP):** Technology for relaying voice calls over IP-compatible networks via the internet.

**VPN (Virtual Private Network):** Inter-network connection for connecting two local networks using a tunnel protocol.

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**WAN (Wide Area Network):** in this report, WAN refers to the internet network, as opposed to a LAN (local area network).

**Wehe:** Android and iOS application, developed by Northeastern University in partnership with Arcep, to detect traffic management practices that are in violation of net neutrality rules.

**Wi-Fi:** wireless communication protocol governed by IEEE 802.11 group standards.

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**xDSL (Digital Subscriber Line):** electronic communications technologies used on copper networks that enable ISPs to provide broadband or superfast broadband internet access. ADSL2+ and VDSL2 are the most commonly used xDSL standards in France for providing consumer access.

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**Zero-rating:** a pricing practice that allows subscribers to use one or more particular online applications without the traffic being counted against their data allowance.

**3GPP:** The 3rd Generation Partnership Project (3GPP) is a collaboration between standardization and normalization bodies that develops technical specifications for mobile networks.

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**4G:** the fourth generation of mobile telephony standards. It is defined by 3GPP Release 8 standards.

**5G:** the fifth generation of mobile telephony standards. It is defined by 3GPP Release 15 standards.



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# ARCEP, NETWORKS AS A COMMON GOOD

Internet, fixed and mobile telecom, postal and print media distribution networks constitute the “Infrastructures of freedom”. Freedom of expression, freedom to communicate, freedom to access knowledge and to share it, but also freedom of enterprise and innovation, which are key to the country’s ability to compete on the global stage, to grow and provide jobs.

Because it is essential in all open, innovative and democratic societies to be able to enjoy these freedoms fully, national and European institutions work to ensure that these networks develop as a “common good”, regardless of their ownership structure, in other words that they meet high standards in terms of accessibility, universality, performance, neutrality, trustworthiness and fairness.

Democratic institutions therefore concluded that independent state intervention was needed to ensure that no power, be it economic or political, is in a position to control or hinder users’ (consumers, businesses, associations, etc.) ability to communicate with one another.

The electronic communications, postal and print media distribution regulatory Authority (Arcep), a neutral and expert arbitrator with the status of quasi autonomous non-governmental organisation,

is the architect and guardian of communication networks in France.

As network architect, Arcep creates the conditions for a plural and decentralised network organisation. It guarantees the market is open to new players and to all forms of innovation, and works to ensure the sector’s competitiveness through pro-investment competition. Arcep provides the framework for the networks’ interoperability so that users perceive them as one, despite their diversity: easy to access and seamless. It coordinates effective interaction between public and private sector stakeholders when local authorities are involved as market players.

As network guardian, Arcep enforces the principles that are essential to guaranteeing users’ ability to communicate. It oversees the provision of universal services and assists public authorities in expanding digital coverage nationwide. It ensures users’ freedom of choice and access to clear and accurate information, and protects against possible net neutrality violations. From a more general perspective, Arcep fights against any type of walled garden that could threaten the freedom to communicate on the networks, and therefore keeps a close watch over the new intermediaries that are the leading Internet platforms.