



# IPv6 Deployment In EU and France

An accelerator towards a common Digital Future

# 01 | IPV6 GLOBAL TRENDS



# Global trends

In a nutshell

## > Driving growth by powering the transformation of network service

**Continuous development** of IPv6 related protocols

IPv4 has limited capabilities while **its price is experiencing an upward trend** in the last 5 years

IPv6 to accelerate the **renewal** of the installed base (terminals and access networks)

**Simplifying** network management: **Auto configuration** features are being further developed

## > Devices and content are IPv6 ready

The device – network – content communication chain is **ready** for IPv6 as all the Operating Systems for hosts support IPv6

Constant number of hardware products **certifications** per year (~200/year) since 2008 as observed by EU IPv6 observatory

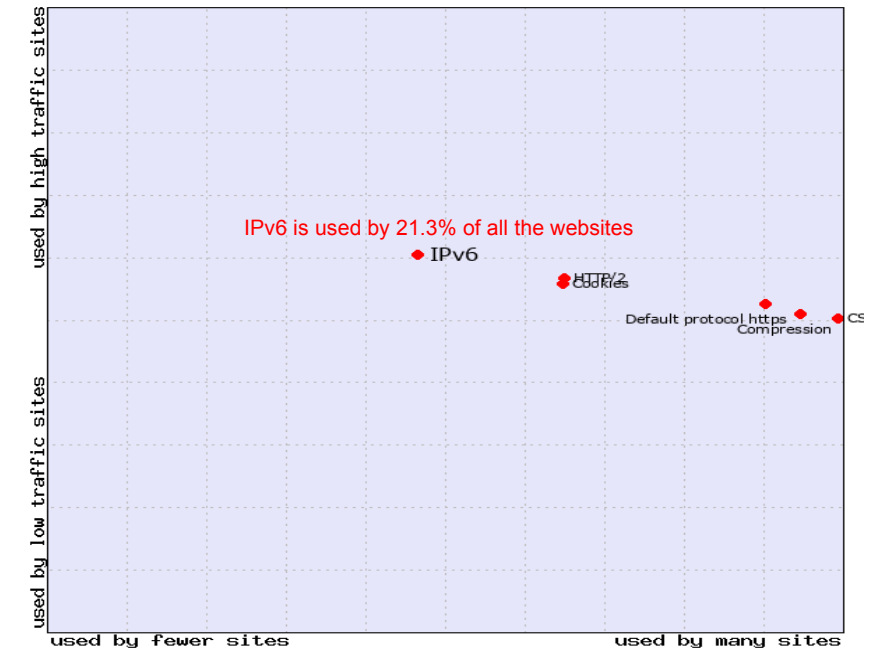
High traffic **sites** are increasingly relying on IPv6 and many more others are following (W3Tech surveys)

## > IPv6 enabling new use cases and emerging technology applications

IPv6 enables the emergence of **new technologies** such as high-quality 5G network, Cloud computing and Internet of Things (IoT) / M2M technologies, on-line gaming

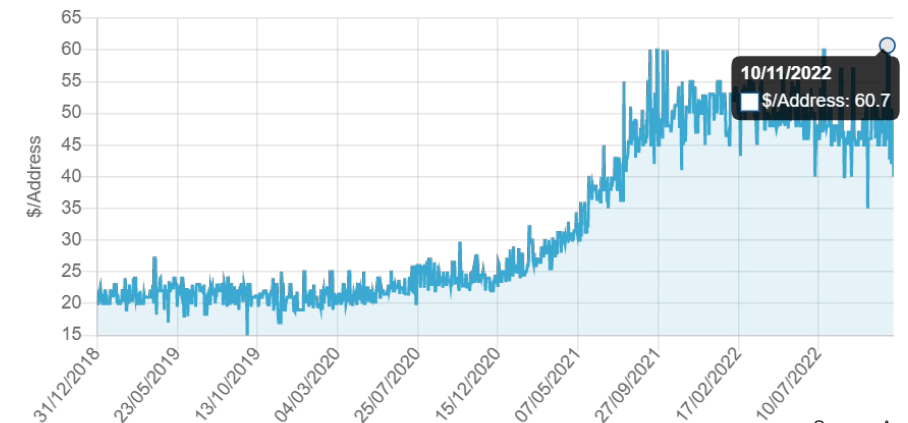
It also powers the application of these technologies by powering **new use cases** like smart home applications, cloud gaming, etc.

IPv6 position in terms of popularity and traffic compared to the most popular site elements



Source: W3Techs, 2022

IPv4 price evolution (USD / address)



Source: Auctions.ipv4.global

# State of IPv6 transition in the world

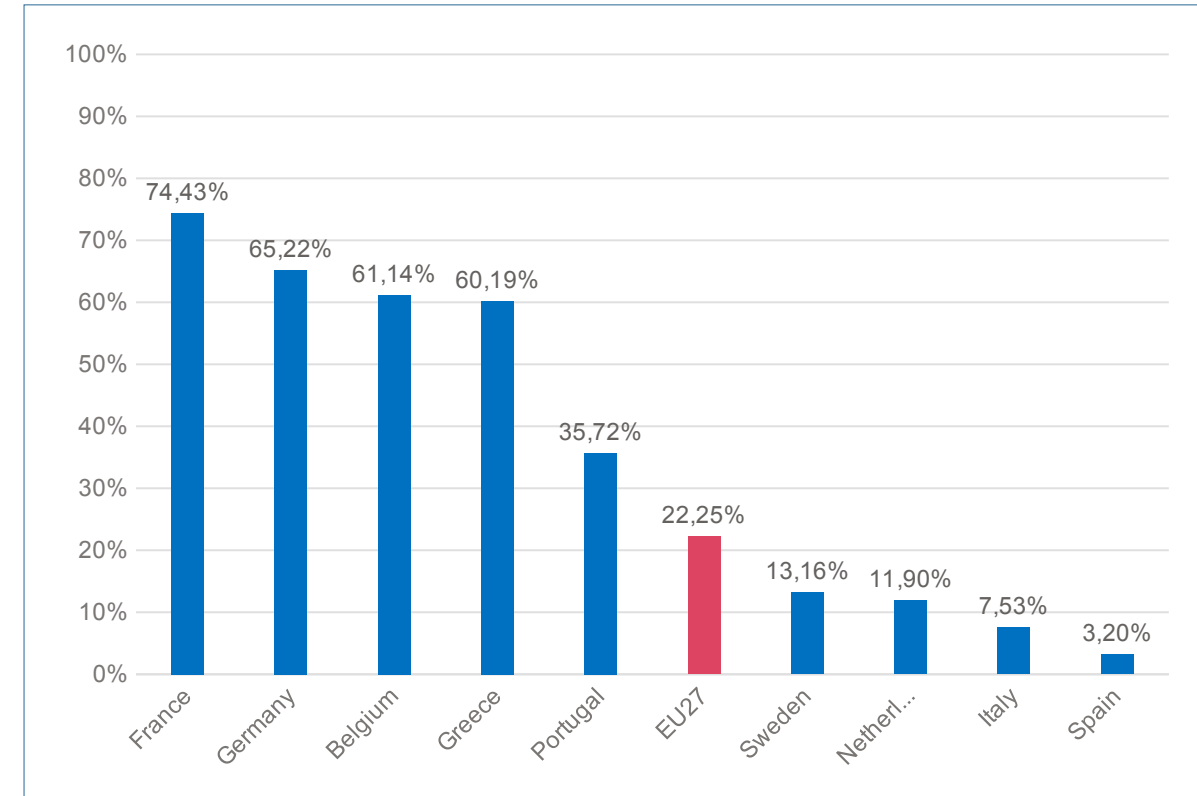


## > IPv6 deployment levels vary considerably from region to region

- There is a **significant increase** in IPv6 in particular in emerging countries
- The three regions with the most advanced transition to IPv6 are Central and South Asia and **Western Europe** (43,53% IPv6 use), as well as North and Central America (42%).
- **France** leads in Europe followed by Germany, Belgium, Greece and Finland

\*Data Google IPv6 statistics

The percentage of users that access Google over IPv6



Source: Google IPv6 statistics, **November 2022**

# IPv6 from the ISPs perspective

## > ISPs have long tested IPv6 and gained valuable experience

- **The core network** is mostly ready for IPv6 deployment and ISPs are now mostly concentrating on enabling the access network
- Most ISP migrating to IPv6 initially enabled it to only **new customers**, but are expanding the scope
- Most often the deployment of IPv6 come at **no additional cost** for the customer

## > Mobile networks are more advanced in migrating to IPv6 vis-a-vis Fixed networks

- The **cost of changing** legacy communication systems and firmware are not incentivizing the migration to IPv6
- **Many fixed operators are still relying on shared IPv4**
- Device operating systems (**Android and ios**) being **IPv6 ready** have facilitated mobile networks IPv6 migration
- Some **national regulators** are requiring mobile networks to be compatible to IPv6 if awarded 5G licence.
- **New features** provided by **IPv6 enhancement** (such as segment routing, network slicing) could improve the quality of 5G transport network

## > The growing number of IoT connected objects remains an important lever for ISPs to migrate to IPv6

- Connected electronics and smart home devices are increasingly connected to internet as part of ISPs strategy to diversify revenue
- **The need for IP addresses** generated by the increased installed based of such devices makes pushes networks to move to IPv6
- Other use cases pushing for IPv6 adoption include **metaverse** and **cloud gaming**





# IPv6 from the Equipment supplier's perspective

## > Major network solutions are systematically being IPv6 compatible

- Major equipment suppliers (Cisco, Juniper and Nokia) have indicated that all the network solutions they sell (i.e. routers, etc.) are **IPv6 compatible**
- ISPs and customers are increasingly **requiring vendors to validate interoperability of IPv6 products**

## > In the many connected objects (smart home, smart TV, etc.), IPv6 is integrated into the operating system

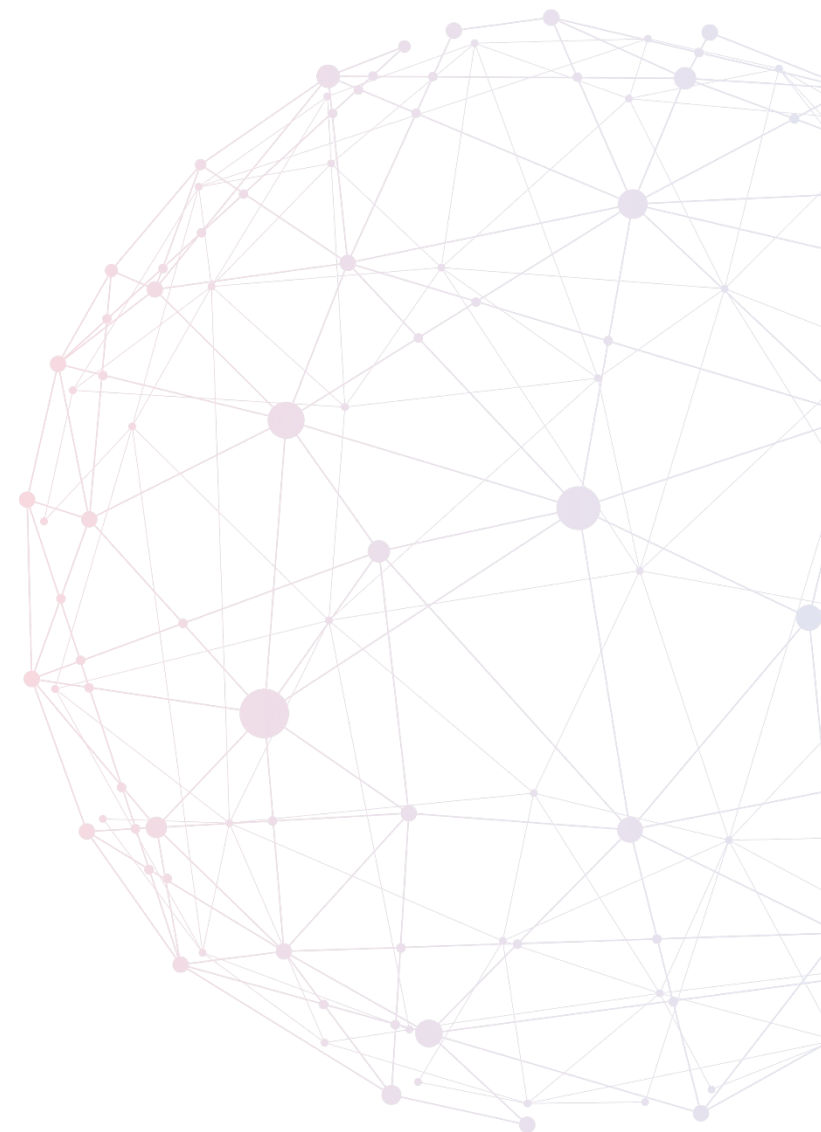
- Even if IPv6 is integrated into the OS it is probable **that is has not been enabled by the connected object's manufacturer**
- Moreover, some OS cannot work properly in IPv6 without an IPv4 address
- IPv6 is widely used in industrial IoT scenarios such as **smart grid**. France has 35 millions smart meters running with IPv6.

## > Transit providers are increasingly managing IPv6 traffic

- Several of the **larger transit providers** are better equipped to manage IPv6



# 02 | WHY PROMOTE IPV6 ADOPTION?



# What has been done at European level to promote IPv6



## > EU Commission has been continuously active to stay in line with leading global developments

- Increased support towards IPv6 in **public** networks and services
- Continued stimulation of the Internet take-up across the European Union
- Strengthening of the support towards the IPv6 enabling of national and **European Research Networks**
- An active contribution towards the promotion of **IPv6 standardisation**
- The integration of IPv6 **in all strategic plans** concerning the use of new Internet services

## > EU ought to design policies to promote IPv6 adoption

- IPv6 is a sustainable protocol for Internet evolution that would **incentivize EU's digital economy**.
- European Commission emphasized the importance of IPv6 in its Strategy on Standardization committed to evaluate possible policy measures to **foster the deployment of IPv6**
- In addition, the European Industry policy plays a critical role in IPv6 promotion. Major countries like France, Germany, the US, India, etc., have released **policies to promote IPv6 deployment**.



# What EU is committed to do in the following years



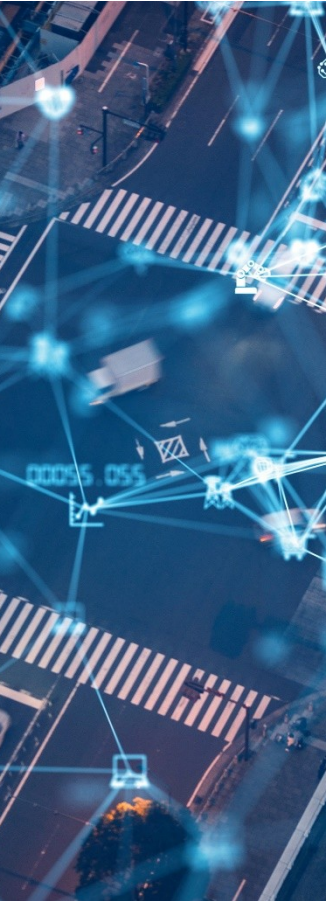
## > An EU Strategy on Standardisation (Feb '22)

- Explicitly addresses the topic of standards for an open and secure internet
  - *Paragraph IV: The Commission will also propose possible policy measures to foster the deployment of key internet standards such as IPv6*
- The Commission is **seeking to bolster its representation within international political and standardisation bodies**
- Is creating a portal to monitor and promote the adoption of IPv6

## > Part of the EU Cybersecurity Strategy (Dec '20)

- Proposes **accelerating the adoption of IPv6 by mandating the phased withdrawal of IPv4 infrastructure** from government use and from the market
  - *Paragraph 1.6: “The Commission will also, in liaison with Member States and industry, accelerate the uptake of key internet standards including IPv6 and well-established internet security standards and good practices for DNS, routing, and email security, not excluding regulatory measures like a European sunset clause for IPv4”*
- Continue **promoting IPv6 at member-state level**

# Why should governments should push for IPv6 adoption?



## Preserving internet availability and quality

- **A shortage of IPv4 addresses** risks decreasing internet availability thereby damaging a number of set-ups (operators, suppliers, hosts, terminals, IT systems for public administrations and businesses, etc.)

## Supporting the innovation for industry and individuals, thus bring economic value in the long-term

- **IPv6 provides** not only larger address space, but also **potential for Internet innovations. IPv4 will gradually stop evolving. All new Internet protocols will be based on IPv6.**
- **As 5G communications and IoT** emerge in many **industry verticals**, a scalable IP technology is required with no constraint in number of addresses and no connectivity constraints.
- **Market entrance equality:** the high prices charged on IPv4 are likely to create a **sizeable barrier** to entry for newcomers to the market
- It is estimated that potential global value created across multiple industry sectors enabled by IPv6 ; **IPv6 innovations could reach \$10.8 trillion in 2030\*.**

## IPv6 implementation should be an integral feature of public sector IT infrastructure

- **As digitalization of public services** is being widely implemented IPv6 is required to maintain the service quality for all users

## Calls for cooperation from the eco-system

- Government, Standard Development Organization, vendors, industrial organization - IPE



## Financial support is needed for all players to have their say

- **The cost of transition is prohibitive**, and many stakeholders might not be able to afford it, thus damaging competition at an international level

\* Source: Global IPv6 and IPv6+ Development—Measurement and Analysis on Social and Economic Impact  
<https://www.rolandberger.com/en/Insights/Publications/Global-IPv6-and-IPv6-Development-Measurement-and-Analysis-on-Social-and.html>

# 03 | IPV6 PROGRESS IN FRANCE



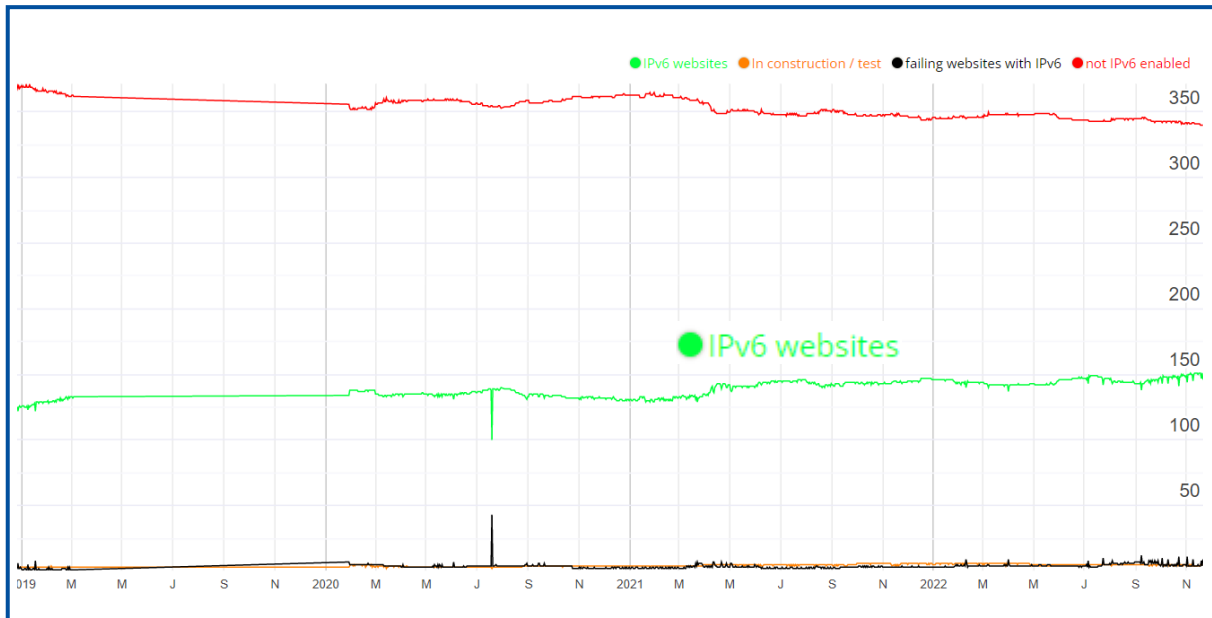
# France well positioned in the IPv6 adoption



## > IPv6 average deployment among the principal metrics accounts for 61.59%

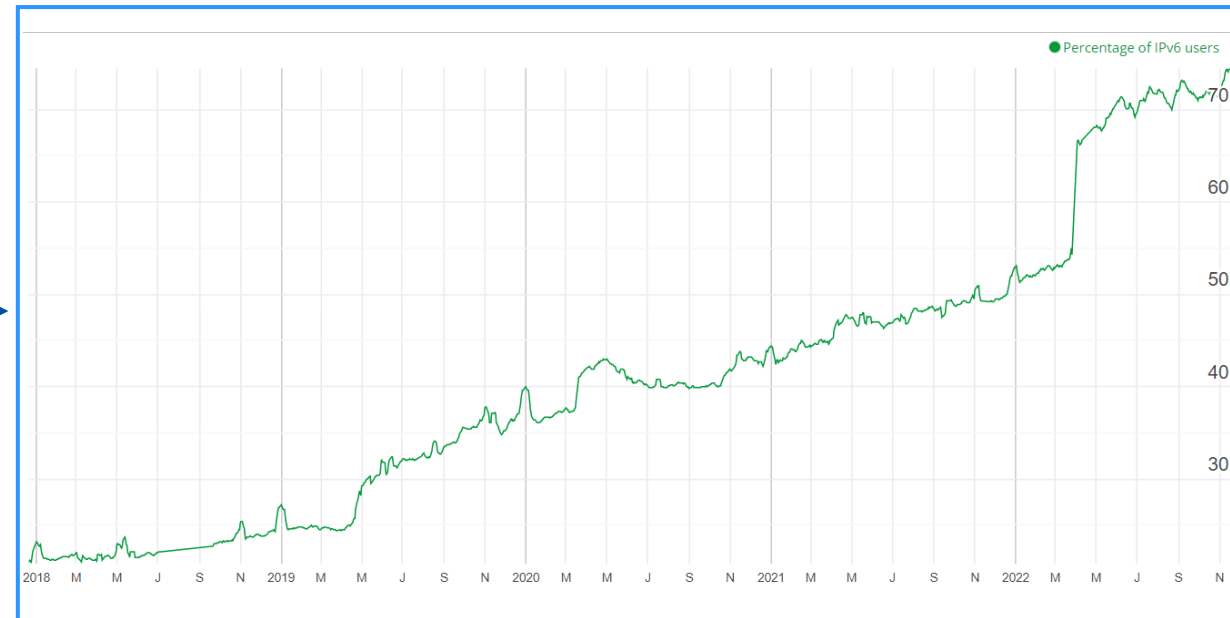
- IPv6 internet **transit** in France accounts for 80.89%
- 74.3% of French **web users** access via IPv6
- 40.03% of **websites** in France are available over IPv6: number of working IPv6 sites ratio is 146/500
  - 35.74% are not IPv6 enabled: ratio 340/500,
  - The rest are either in process of testing or failing to be IPv6 enabled
- 38.73% of **routable prefixes** rely on IPv6

### Websites moving slowly towards IPv6



Source: Cisco 6 Lab, Google IPv6 statistics, November 2022

### Significant increase in IPv6 users



Source: Cisco 6 Lab, Google IPv6 statistics, November 2022

# Public and private actors' approach on IPv6 adoption



## > ARCEP regulation is incentivizing IPv6 adoption

- **ARCEP has conditioned the allocation of 5G spectrum with IPv6 adoption**
  - Operators awarded a license to use 5G frequencies in the 3.4 – 3.8 GHz band in Metropolitan France were obliged to make their mobile network compatible with IPv6 before December 2020

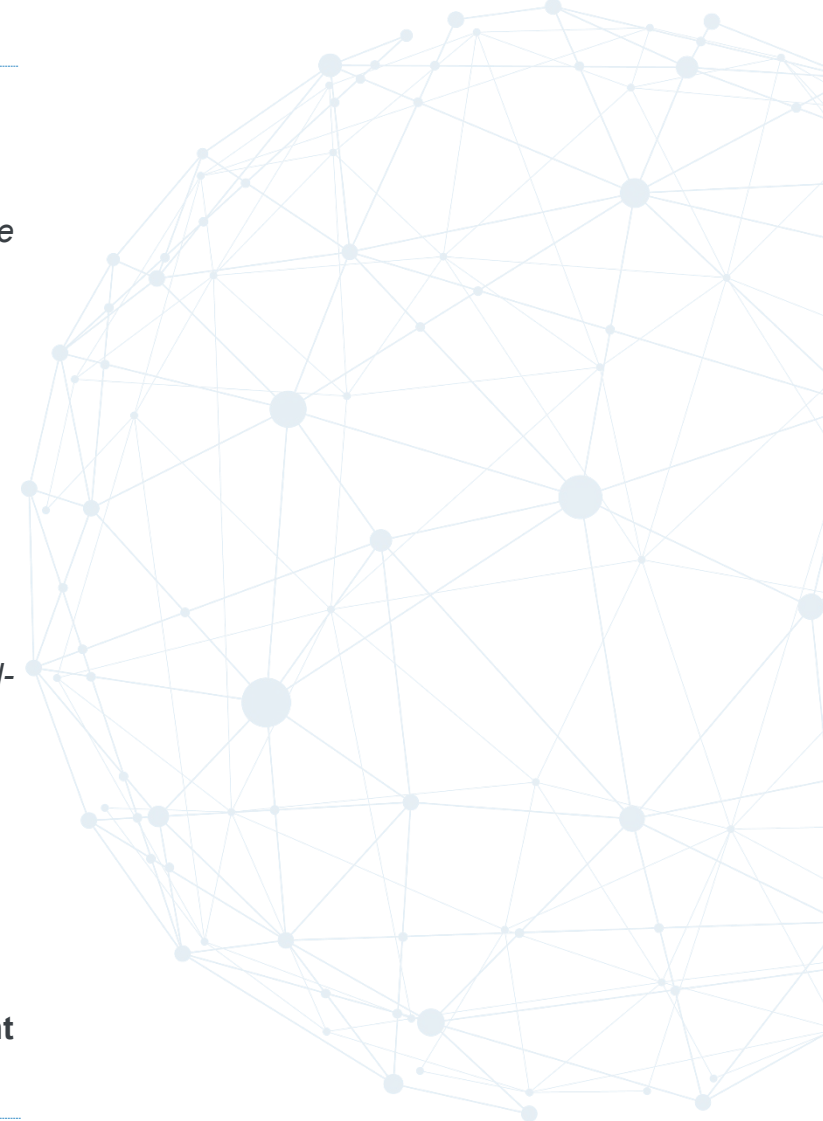
## > Mobile networks are at the forefront

- **Significant progress made in the recent years**
  - Most of the major operators activate IPv6 by default (apart from Free)
- **IPv6 widely adopted on iPhone mobiles, followed by Android**
  - More than 90% of iPhones (on average) adopted IPv6
  - Android follows - IPv6 adoption between 40% - 70% depending on the network operator\*
  - i.e. For SFR The rate of iPhone IPv6-enabled customers has increased from 0% by mid-2020 to 90% by mid-2021\*

\*Source: Arcep Barometer of the transition to IPv6 in France, 2021

## > Fixed ISP are less advanced in the transition towards IPv6 adoption

- **Among fixed technologies, operators are mostly invested in FTTH:**
  - IPv6 well developed in terms of infrastructure among fixed ISP
  - IPv6 well enabled (transmitting and receiving IPv6 traffic) by main fixed ISPs
- **Most of the fixed broadband operators have developed the IPv6 activation-by-default feature if the client is ready**





# In a nutshell



- > IPv6 a sustainable way for the growing internet ecosystem and of critical importance for France's digital economy
- > France well positioned in the IPv6 adoption
- > ARCEP continuously pushing operators for IPv6 adoption
- > Significant increase in IPv6 users while websites migration moving slowly
- > Mobile network operators at the forefront of IPv6 adoption in France while fixed ISP still to progress

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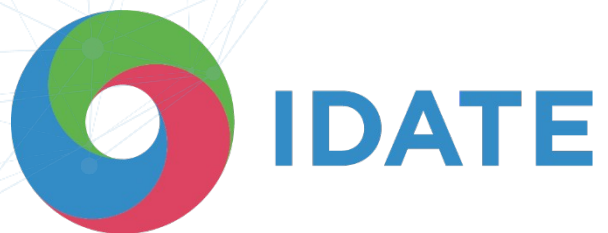
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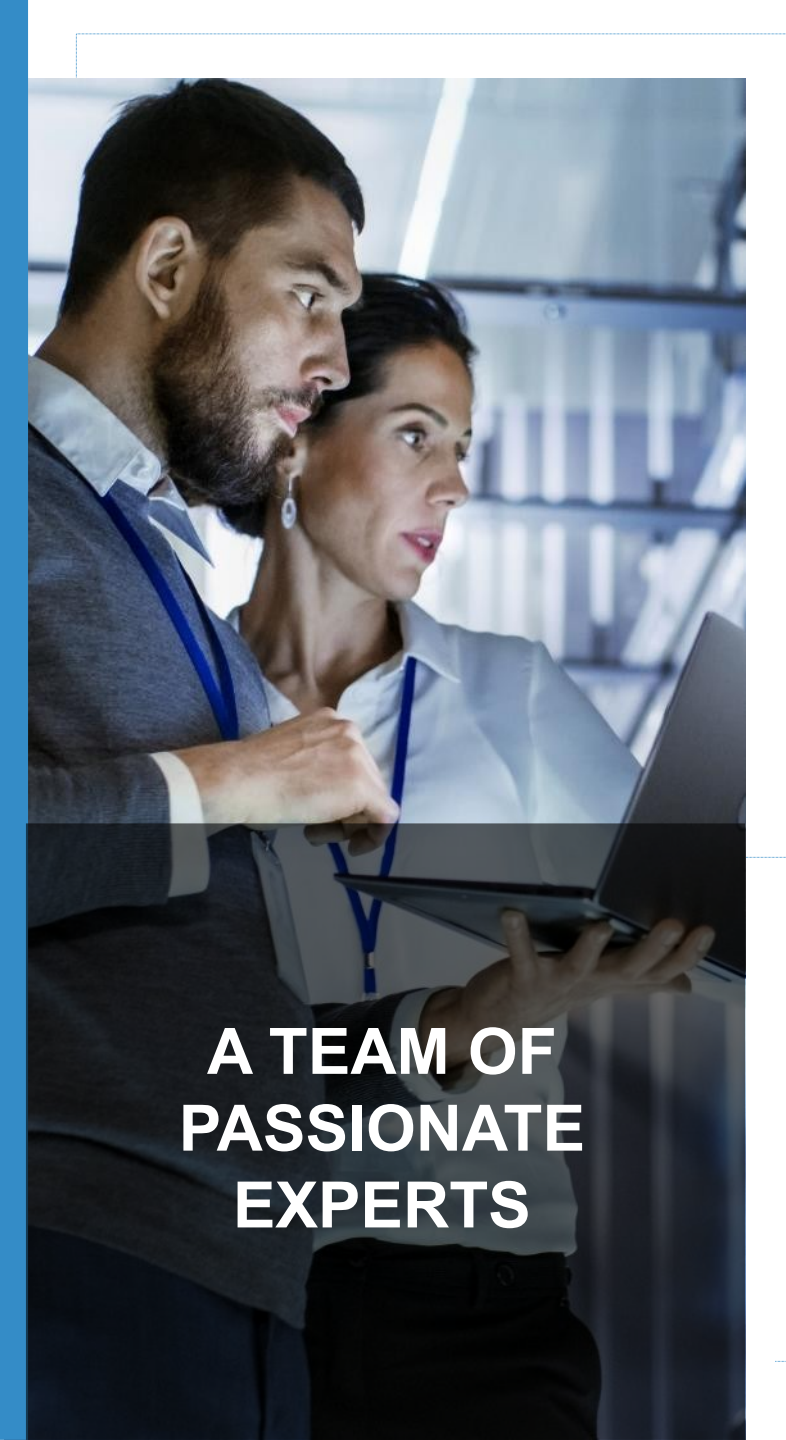


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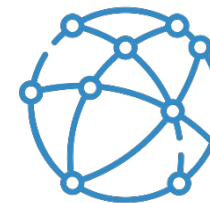
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