

Role of Wi-Fi in Achieving GIA Objectives



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Role of Wi-Fi in Achieving GIA Objectives

- Role of Wi-Fi in Broadband Connectivity
- Wi-Fi Spectrum in Europe
- 6 GHz Wi-Fi for Consumers and Enterprise

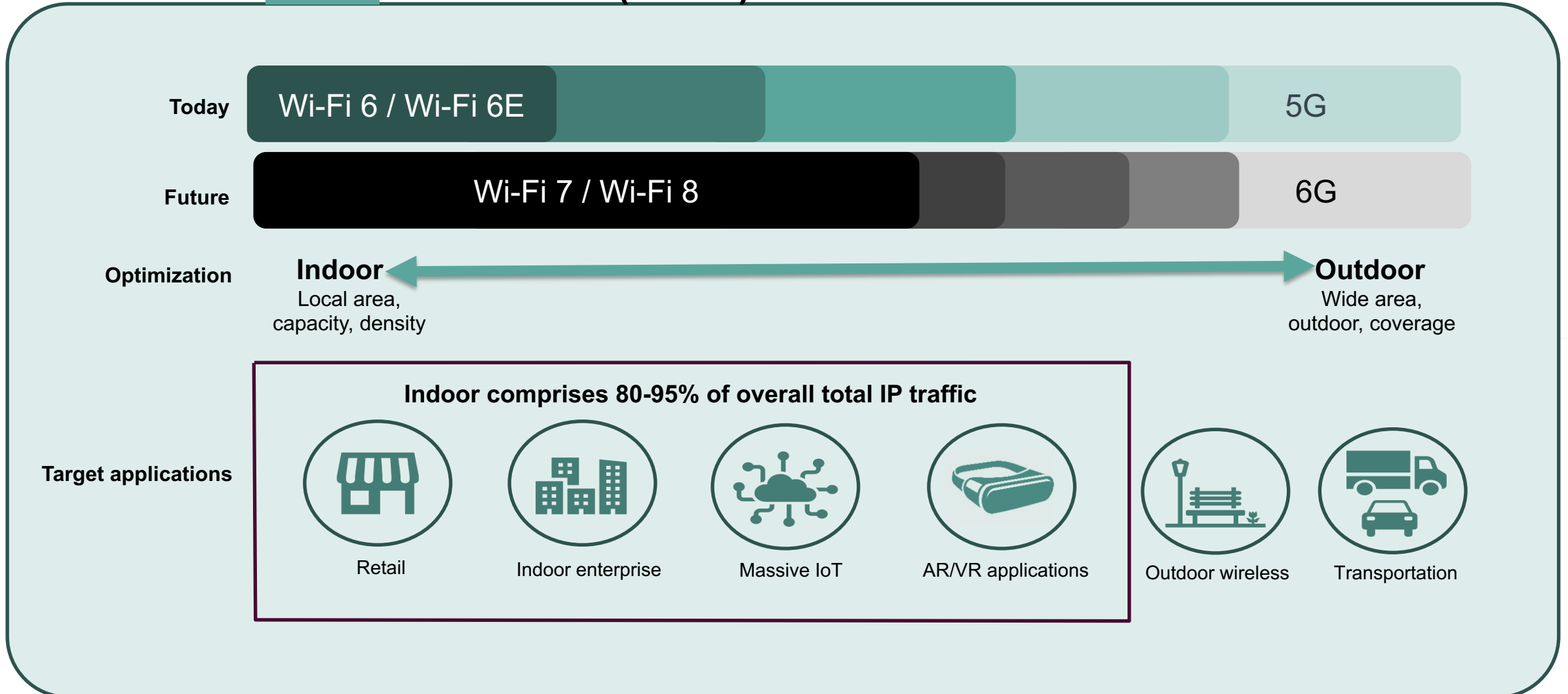


Role of Wi-Fi in Broadband Connectivity

Growing demand for broadband connectivity - predominately indoors



Trend: most data (~80%) is consumed indoors

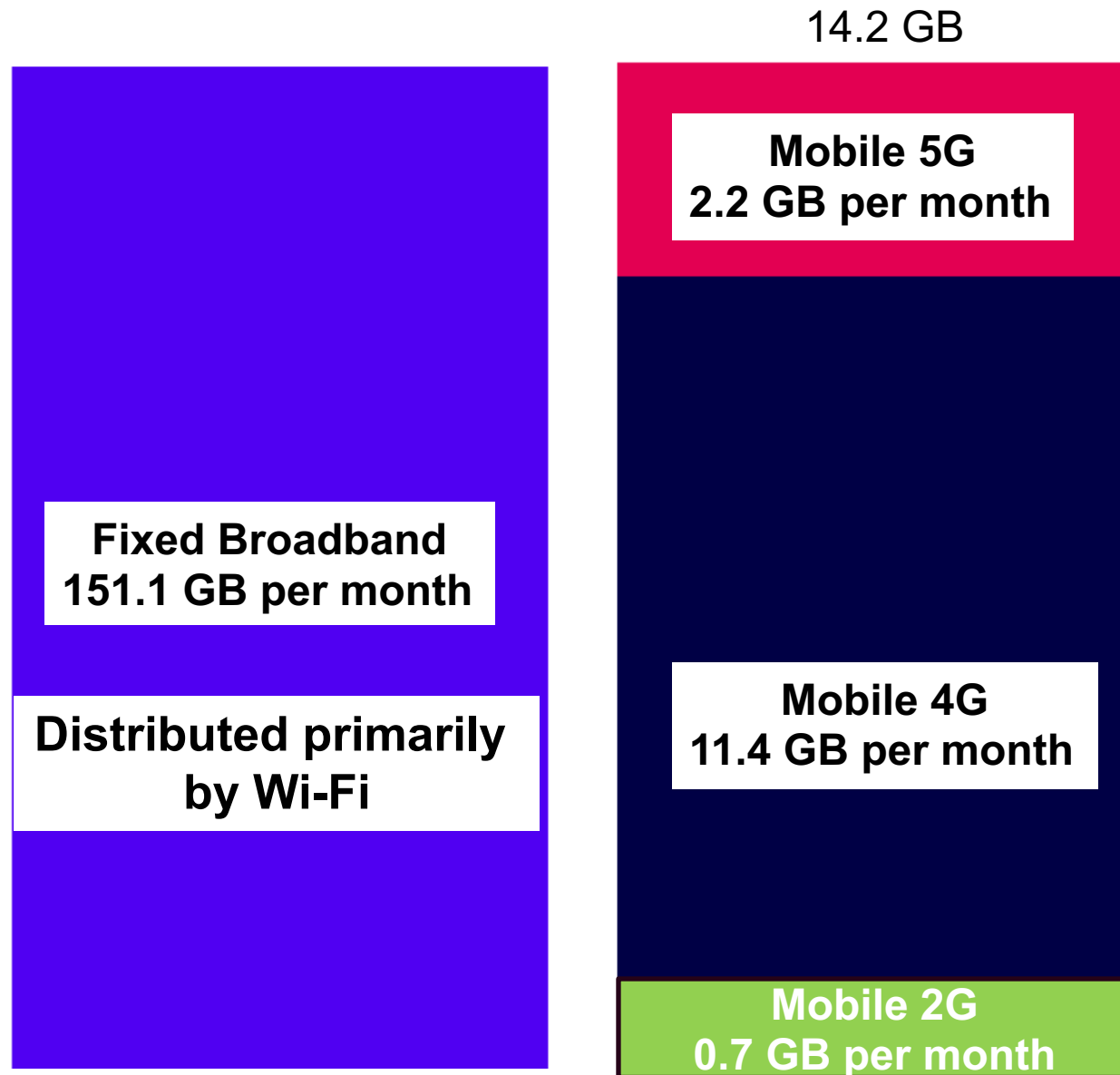


Growing demand for broadband connectivity - predominately indoors



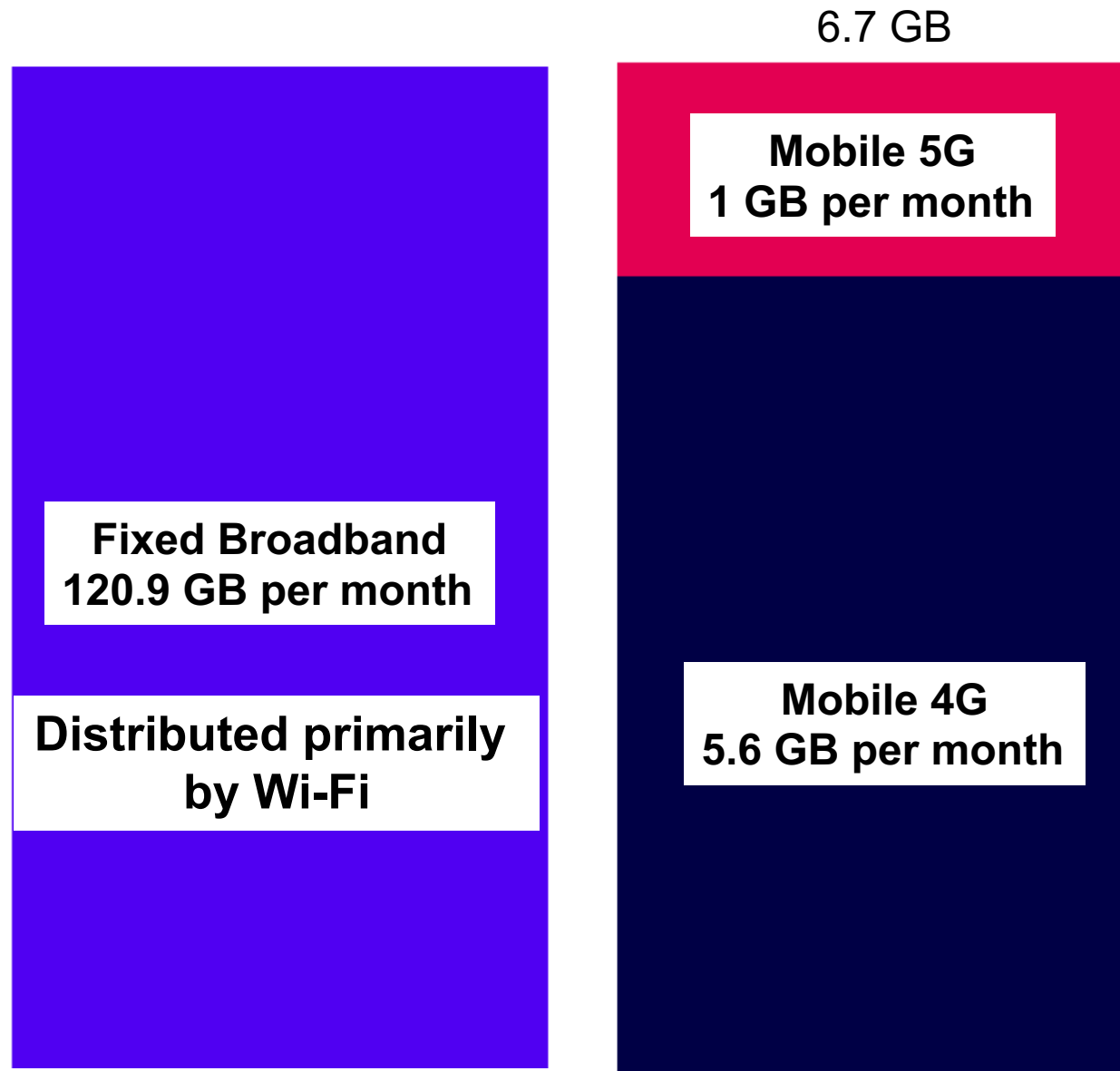
Broadband Demand Drivers	
Mainstream Use Cases	Emerging Use Cases
Video viewing Social Networking Gaming E-Commerce Web Browsing	Cloud Computing AR/VR/Metaverse AI Automation/M2M/IoT Holographic Video Projection

Average data consumption per capita per month in France



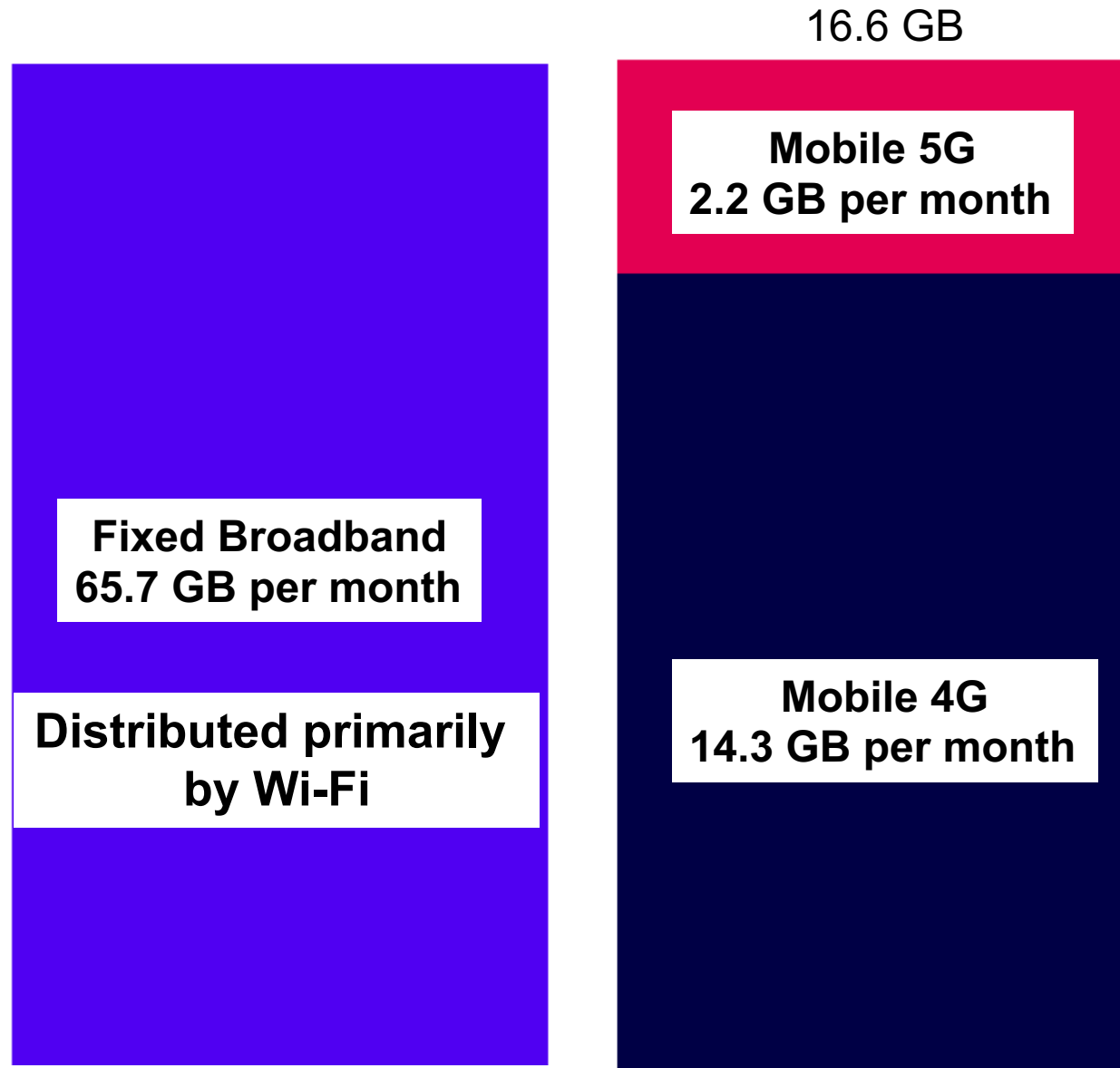
Source: [UK Ofcom International Broadband Scorecard 2023](#)

Average data consumption per capita per month in Germany



Source: [UK Ofcom International Broadband Scorecard 2023](#)

Average data consumption per capita per month in Italy



Source: [UK Ofcom International Broadband Scorecard 2023](#)

Wi-Fi is key to unlocking Gigabit connectivity benefits in Europe

- EU members are prioritizing deployment of very high-capacity fixed network infrastructure – but connectivity is only as good as the narrowest bottleneck
- Governments and telecom providers invest considerable resources to deploy in-building physical (Gigabit) infrastructure – but over 80% of data traffic is delivered by Wi-Fi
- Consumers pay for Gigabit connectivity – but most connect via Wi-Fi





Wi-Fi Spectrum in Europe Cause for Concern

Delivering Gigabit Connectivity with Wi-Fi

- Wi-Fi functionality and optimal performance depend on access to:
 1. Wider channels (bandwidth)
 2. Greater number of channels (channel diversity)

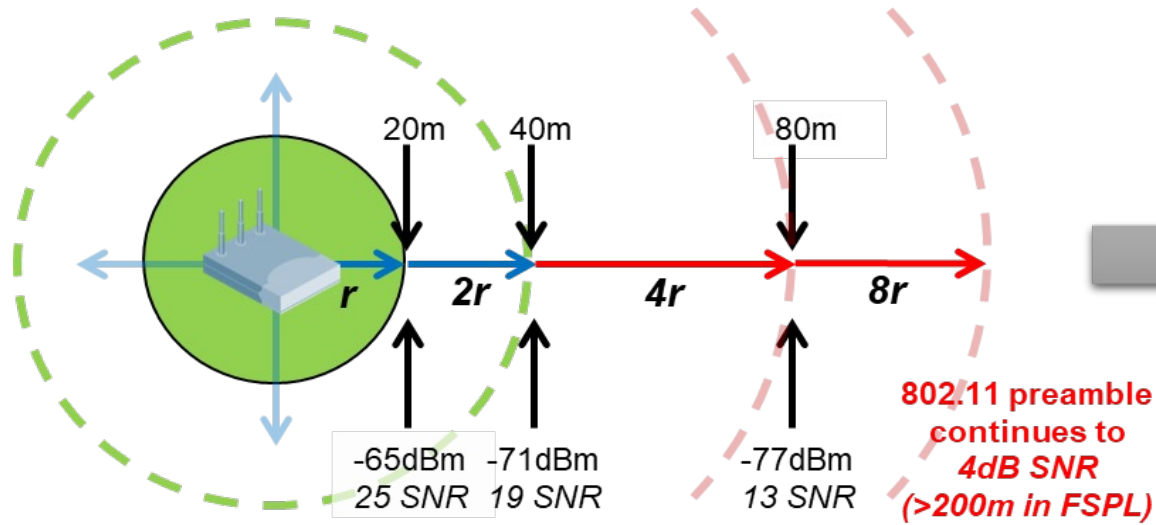
Gigabit Requires 80 / 160-MHz Channels



	1SS	2SS
20 MHz	143Mbps	286 Mbps
40 MHz	286 Mbps	573 Mbps
80 MHz	600 Mbps	1.2 Gbps
160 MHz	1.2 Gbps	2.4 Gbps

Wi-Fi Performance Depends on Channel Diversity

Self-Coordination Requires 2+ Cell Isolation



Sources: Aruba Networks Hewlett Packard Enterprise

Wi-Fi devices are self-coordinating – relying on Contention Based Protocol (SNR is a major factor)

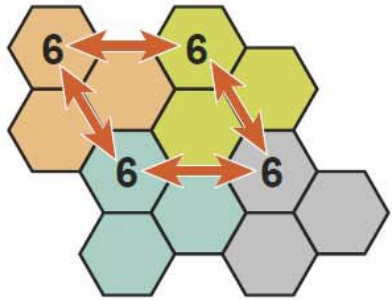
- Fewer channels Increase collision probability and raise noise floor - under surge conditions, systems can become unusable

Enterprise Wi-Fi Design

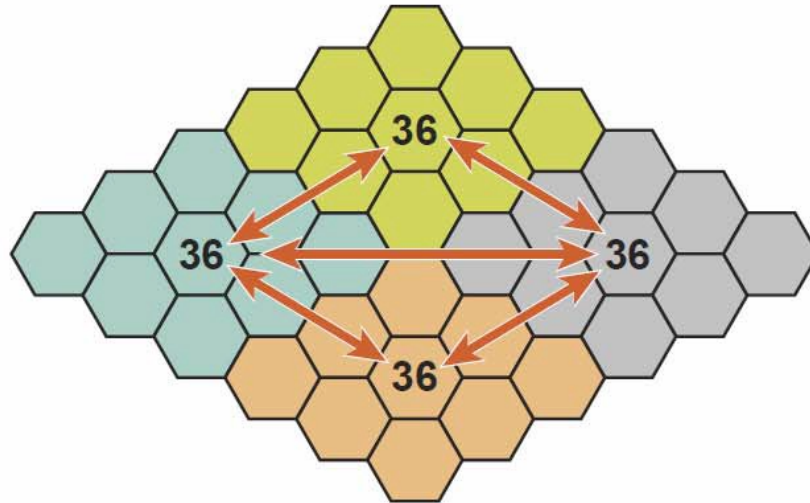
More Channels Improve Performance & Reduce Interference



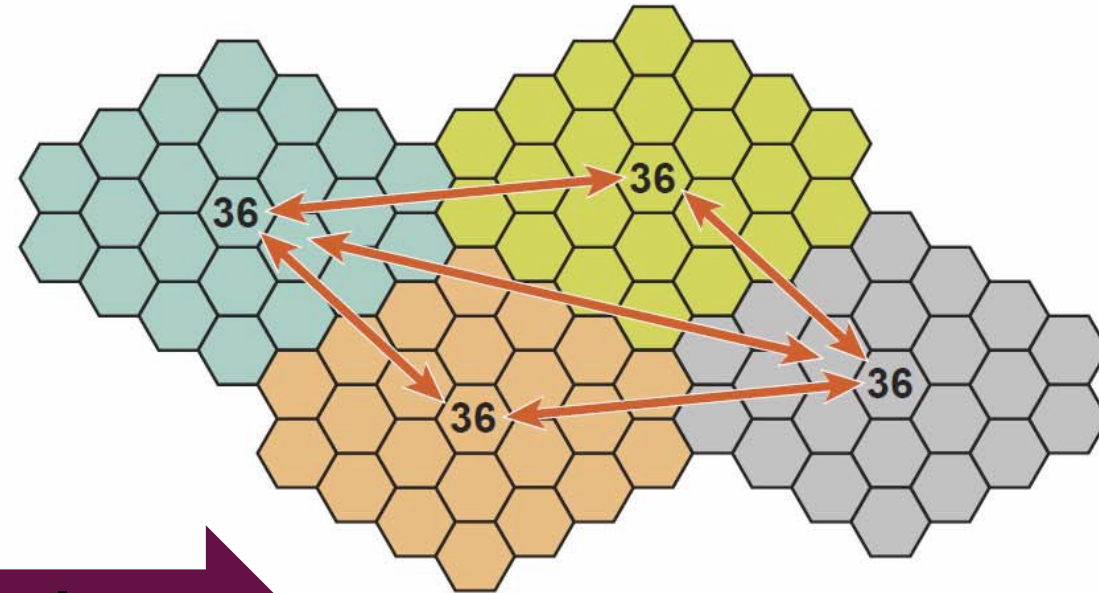
3 Channel



9 Channel



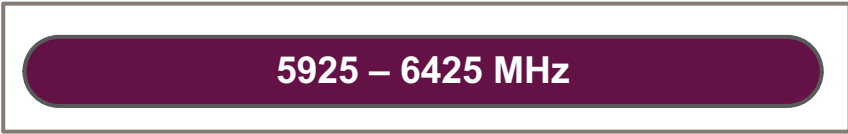
23 Channel



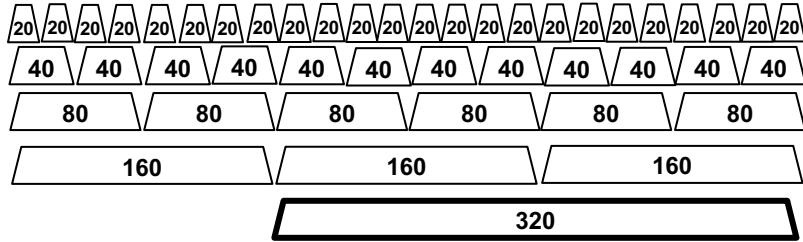
Benefits of Larger Number of Channels

- Lower interference probability
- Lower noise floor
- Higher data rates
 - Less airtime to transmit same amount of data
- Capable of absorbing much higher loading levels by distributing demand

Optimal Wi-Fi Connectivity = Access to 5925-7125 MHz band



- 24 x 20 MHz
- 12 x 40 MHz
- 6 x 80 MHz
- 3 x 160 MHz
- 1 x 320 MHz



- Fact: Wi-Fi relying on dynamic random spectrum access and contention-based protocols require access to multiple channels to maintain acceptable performance
- Fact: Latest Generation [Wi-Fi 7](#) designed for Extremely High Throughput -- channel bandwidth of up to 320 MHz



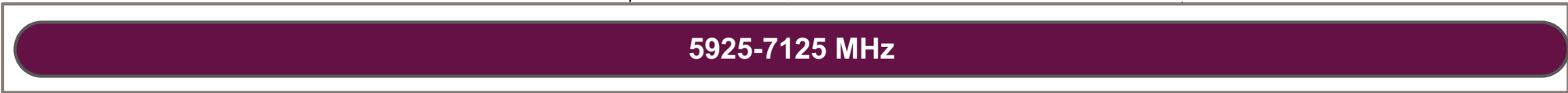
925 MHz

6425 MHz

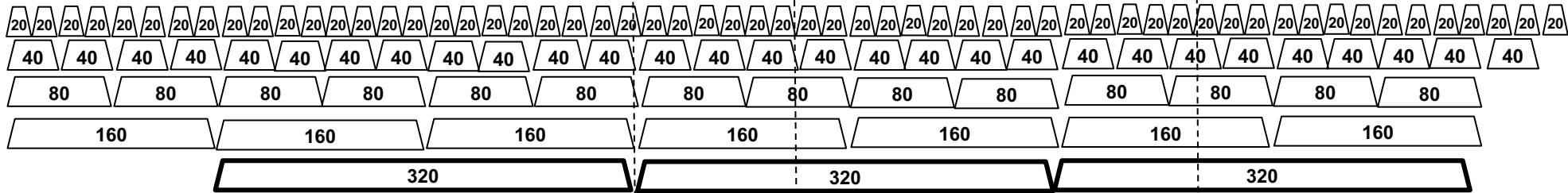
6525 MHz

6875 MHz

7 125 MHz



- 59 x 20 MHz
- 29 x 40 MHz
- 14 x 80 MHz
- 7 x 160 MHz
- 3 x 320 MHz



Insufficient
Wi-Fi Spectrum
=
Broadband
Network
Bottlenecks

- European Commission appropriately recognized that Gigabit connectivity in the European digital transition requires Wi-Fi functionality
- Wi-Fi access to 6.425-7.125 GHz is imperative to support current and future generations of Wi-Fi – ***there is no alternative spectrum***
- Inadequate spectrum capacity degrades Wi-Fi performance and, ultimately, undermines the Gigabit infrastructure investments and benefits



6 GHz Wi-Fi for Consumers and Enterprise

We often joke of Wi-Fi as...

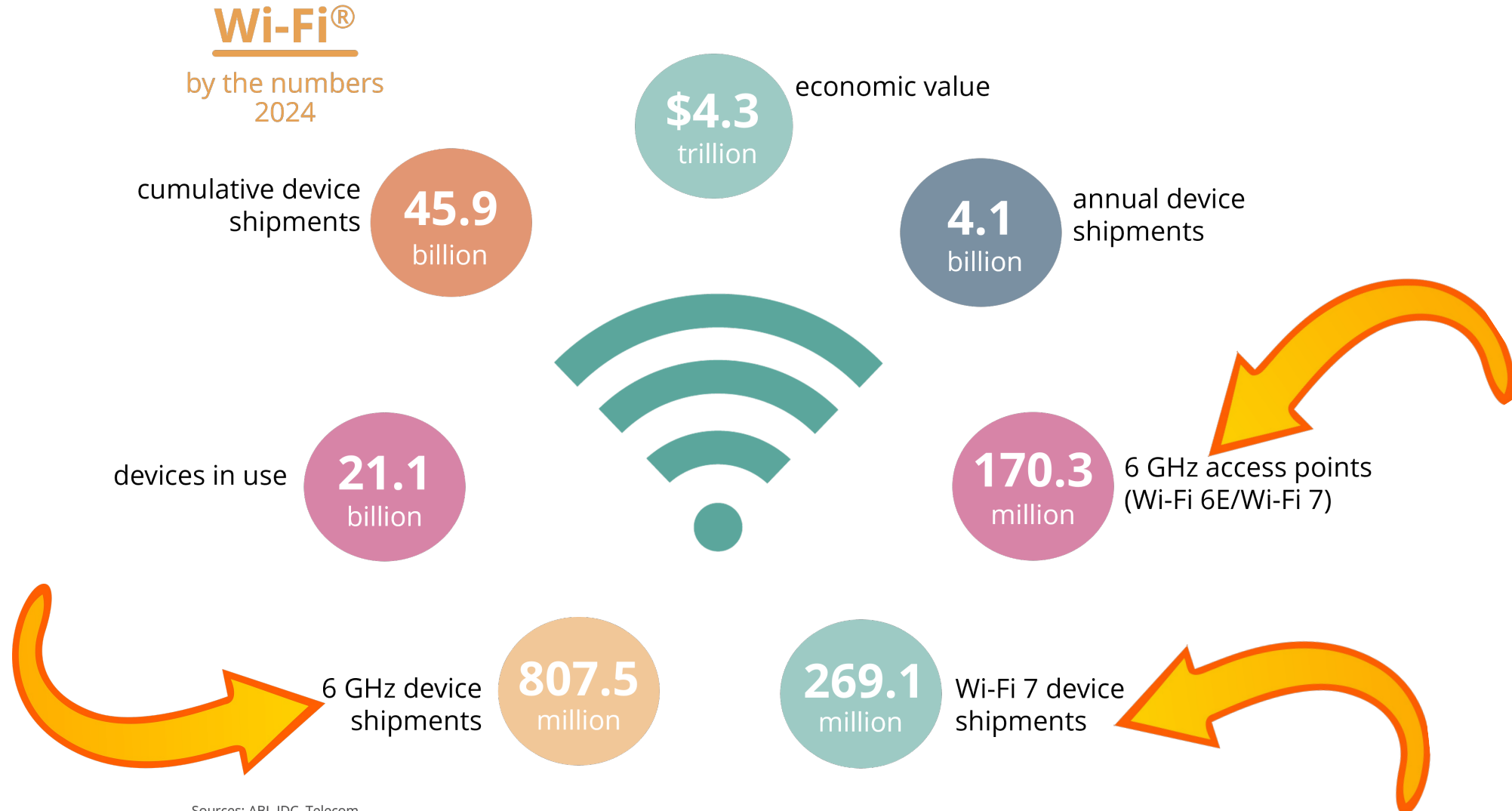


Wi-Fi is central to our lives ...



... but 6 GHz Wi-Fi is central to enhanced speed, capacity and reliability

Wi-Fi in 2024 by the numbers

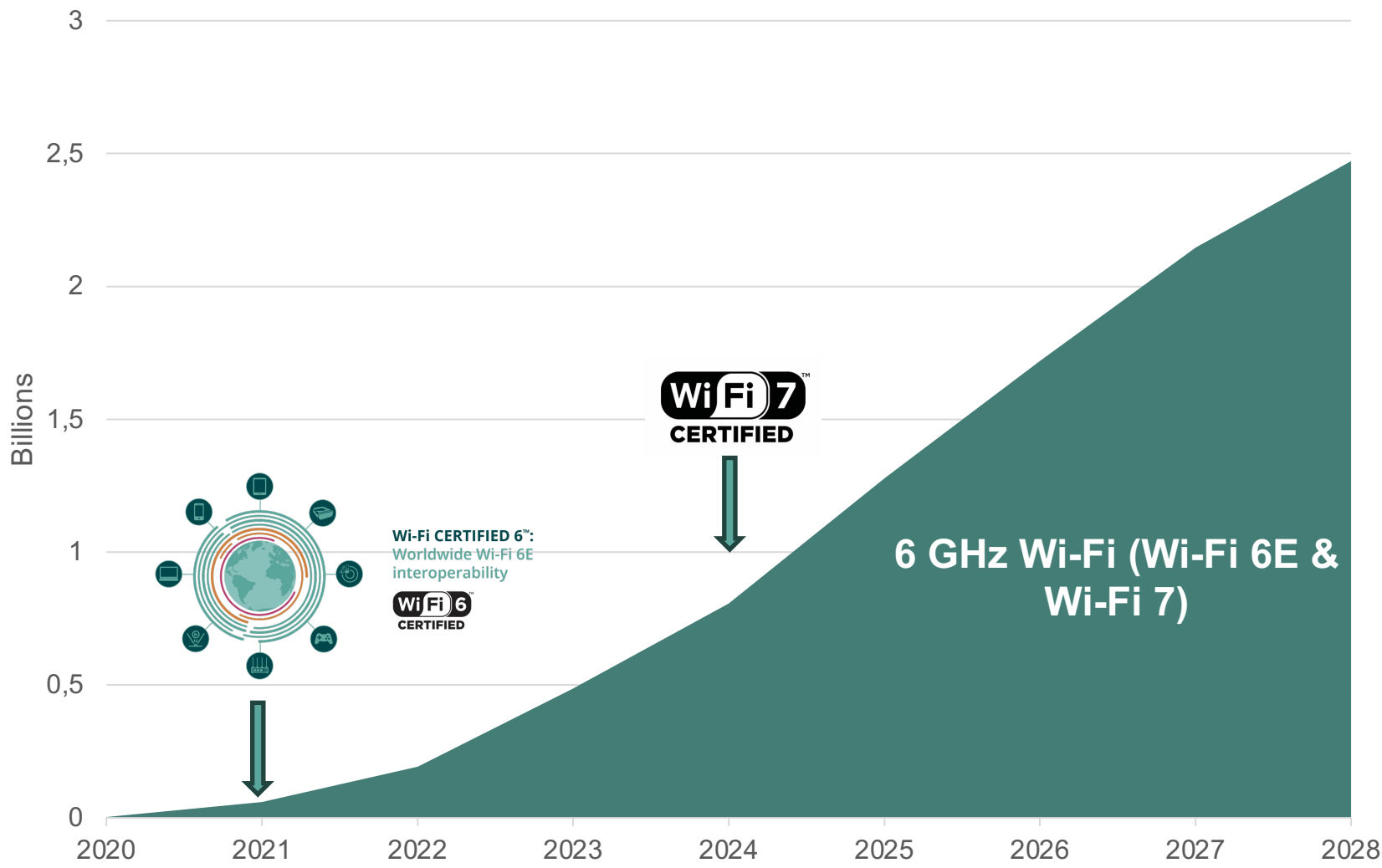


Sources: ABI, IDC, Telecom Advisory Services

6 GHz Wi-Fi adoption reaches 2.5 billion in 2028



6 GHz Device Shipments



IDC Research , 2023

6 GHz Wi-Fi: Consumer and Enterprise Perspective



- Thriving 6 GHz Wi-Fi device ecosystem (e.g., flagship smartphones, laptops, access points) is *now* available to European consumers and enterprises– ***but devices’ performance inhibited by the lack of access to 6.425-7.125 GHz spectrum***
- Allowing Wi-Fi access to 6.425-7.125 GHz will improve connectivity experiences, performance and deliver significant socioeconomic benefits to European consumers and enterprises

References

Thank you

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Global economic value of Wi-Fi® to reach \$5 trillion in 2025

Wi-Fi® worldwide economic value has grown beyond expectations

In 2021, the global economic value generated by Wi-Fi will reach \$3.3 trillion USD and is expected to grow to reach \$5 trillion by 2025, according to a new study commissioned by Wi-Fi Alliance®. This growth represents a 50 percent increase from the 2021 value of \$3.36 trillion to the projected value in 2025, underscoring the critical role Wi-Fi continues to play in economies across the globe.

The study, developed for Wi-Fi Alliance by economists at Telecom Advisory Services, focuses on 15 economies: Australia, Brazil, Canada, France, Germany, Japan, Mexico, New Zealand, Poland, Singapore, South Korea, Spain, the United Kingdom, and the United States, as well as an estimate for the European Union.

The economic value of Wi-Fi for each economy studied was developed by assessing secondary factors, plus global developments that have increased the Wi-Fi value—namely, the growing adoption of 5G and growing bandwidth capabilities opening the 6 GHz band for unlicensed use. The study also considers public regulatory agency announcements in value estimates, meaning that countries allowing Wi-Fi use in all 5.8 GHz bands will maximize the economic benefits that Wi-Fi provides.

Wi-Fi 6 and 6 GHz band bring new opportunities, economic resilience

Due to its [flexibility](#), Wi-Fi has proven to be a [key driver of digital resilience](#) and innovation during the COVID-19 pandemic. The study results reveal that industry-wide support for Wi-Fi growth and development is essential to continue realizing the benefits Wi-Fi technology provides. By the end of 2021 there will be 16 billion Wi-Fi devices in use. Market adoption of 5G will grow to 2.5 billion devices in 2021, including nearly 240 million Wi-Fi 6E products which are capable of operating in the 6 GHz band. Wi-Fi 6E and access to the 6 GHz band enables a suite of advanced capabilities—such as multi-gigabit Wi-Fi for supporting unified communications, cloud gaming, and immersive telepresence—the combined effects of which could exponentially increase Wi-Fi value in years to come.

Defining and quantifying economic value of Wi-Fi

Economists calculated economic value based on key factors listed below for each economy to develop the economic value, as reported in Q2, Q3, Q4 values for each country and the European Union were determined the economic aggregated a global value of Wi-Fi.

Global Value of Wi-Fi®	
2021	2025
\$3.3 trillion	\$4.9 trillion

Source: Telecom Advisory Services, Wi-Fi Alliance

Wi-Fi Economic Value Highlights

Wi-Fi®: sustainable connectivity

As the world looks to curb energy usage, Wi-Fi® can make individuals and organizations more efficient.

With fast prices climbing and the climate changing, prioritizing energy efficiency is crucial for individuals and organizations alike. As rising fuel prices impact travel and energy costs, corporations are turning to digital solutions, such as video conferencing and smart building technology, supported by Wi-Fi, to become more energy efficient.

Wi-Fi enables people to hold energy and efficient business meetings digitally, rather than in-person, reducing travel and therefore energy consumption. High-resolution video calls and extended meeting Wi-Fi services can enable executives to participate in productive and immersive interactions with colleagues and contacts on the other side of the world. Wi-Fi can also enable greater automation, reducing the need for workers to be on-site each day, cutting the fuel usage associated with commuting.

Wi-Fi, which plays a key role in enabling the Internet of Things (IoT), can be used to remotely control and monitor a wide range of electronic equipment from process and air conditioners to heavy machinery and production robots. This enables organizations to detect when energy is being wasted and adjust their processes accordingly. Wi-Fi connected sensors can also generate helpful data that can then be used to optimize a building's heating and cooling operations. [Wi-Fi Connected Buildings](#) is designed to support large numbers of simultaneous connections, making it the ideal technology to collect real-time data from environmental sensors.

Wi-Fi: the sustainable solution for connectivity

Digital technologies are striving to be as energy efficient as possible, and Wi-Fi is the top choice for reliable, low-power connectivity. SmartM Agency for Ecological Transition (SMART) has launched a campaign¹ to encourage French citizens to use Wi-Fi rather than 4G, and the agency notes that using Wi-Fi reduces CO2 pollution 23-fold. Similarly, mobile operator Orange France² will remind customers to switch to using Wi-Fi at home during periods of peak energy consumption.

An inherently low-power technology, Wi-Fi is the most efficient way to provide high-speed connectivity within homes and buildings. Wi-Fi technology enables extensive use of low-power, cognitive radio techniques, such as spectrum sensing, spectrum sharing, and adaptive transmission.

Wi-Fi's great merit is to use energy to generate wealth to reach end users because they rely on indoor routers, rather than outdoor base stations. This will become an even bigger consideration as builders add more insulation.

Source: SMART Agency for Ecological Transition, Orange France

Wi-Fi Sustainability highlights

Wi-Fi®: affordable connectivity for all

The inherent strengths of Wi-Fi® deliver digital inclusion at a low cost

With the total number of internet users worldwide estimated to grow from 3.9 billion in 2018 to 5.3 billion in 2023, global economies and societies are becoming increasingly digital. However, connectivity is not consistently available to everyone. By relying on expensive cellular devices to access the internet, in conjunction with high monthly data fees, low-income communities are at risk of being excluded from the connectivity that has become an essential component of daily life. Through economies of scale and utilization of unlicensed spectrum, Wi-Fi provides affordable, inclusive connectivity to millions of users.

Sharing Wi-Fi within communities

Wi-Fi allows dozens of community members to share a single broadband internet connection, making the service more affordable for each individual. As such, Wi-Fi is the preferred source of internet connectivity for millions of people around the world, as it also enables the sharing of devices. In Africa, for example, where only 33% of individuals were using the internet in 2021 compared to 65% of individuals worldwide, sharing broadband through Wi-Fi will be one of the most efficient ways to bring more people online.

Community Wi-Fi services across the developing world are experiencing exponential growth, bringing more and more people online. There will be nearly 420 million public Wi-Fi hotspots worldwide by 2023, up from 169 million hotspots in 2018, according to forecasts by Cisco.

In rural areas, extending to bury fiber in rugged terrain can present logistical challenges, and utilizing Wi-Fi in these regions is a cost-saving alternative. For example, the Government of Mexico has deployed over 40,000 public Wi-Fi hotspots since 2012, creating a robust infrastructure that allows residents to access crucial services like telemedicine, remote learning, and government services, in rural India.

Given the challenging economics of serving far-flung communities, it is vital that each broadband connection is shared as widely as possible. In South Africa, the 4,000 residents of the remote rural community of Marikati can pay a small monthly fee to access a Wi-Fi-based community network. The Government's project installs and maintains a dozen solar-powered Wi-Fi mesh network stations that are mounted on and inside houses around Marikati to cover an area of 30 square kilometers.

In rural Ireland, Galway County Council has installed 40 Wi-Fi hotspots under the EU's WiFi4EU program, which promotes free access to Wi-Fi connectivity for citizens in public spaces, such as parks, squares, public buildings, libraries, health centers, and museums in municipalities throughout Europe. Peter Keaveney, Catholic Teach

Source: Cisco, Government of Mexico, Catholic Teach

Wi-Fi Affordability highlights

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COVID-19 AND THE ECONOMIC VALUE OF WI-FI

December 2020

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COVID-19 and Wi-Fi