



5G MONETIZATION CHALLENGES

2023-2027 Analysis

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An analysis based on a study conducted by Juniper Research, a London-based market research partner that maintains a detailed database of all mobile service providers worldwide, with complete data on each operator, infrastructure and service.



INTRODUCTION

Ultra-fast connectivity



We live in hyper-connected societies through mobile devices that allow us to keep updated with everything happening around us. The telecommunications sector has continued innovating since the arrival of the internet and smartphones. This perfect combination has changed the lives of human beings in every aspect. The immediacy of our world needs connectivity, which is becoming faster and faster.

We are aware of the long-awaited arrival of the 5G network and its considerable impact on the evolution of our lives, but what is 5G? It is the fifth generation of mobile network technology that offers a faster, more reliable and more secure data connection than previous generations of mobile networks such as 4G and predecessors.

With much more immediate download and upload speeds than previous technologies, the 5G network offers higher capacity, lower latency and more secure connectivity.

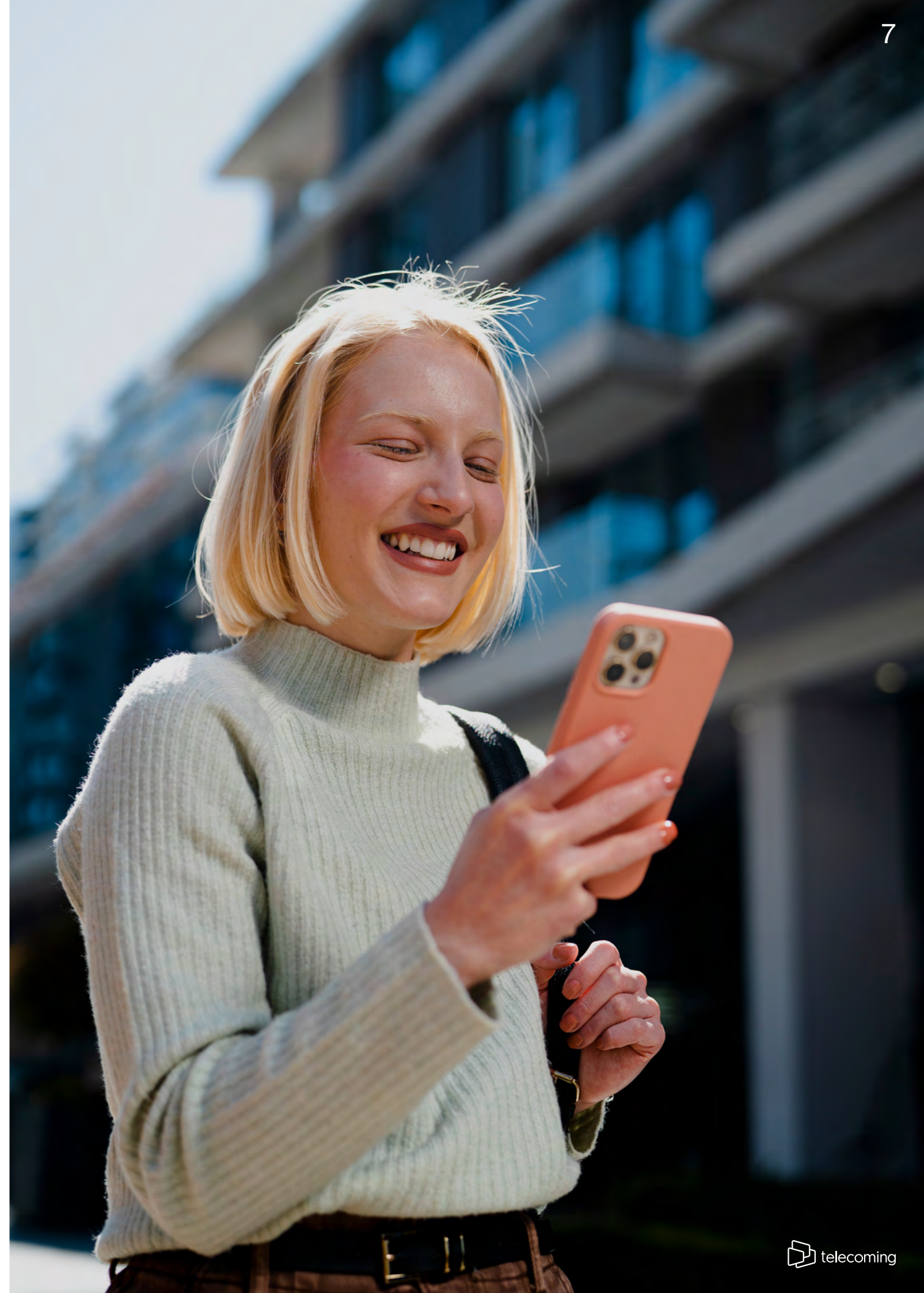
5G is also an enabling technology for the Internet of Things (IoT), which connects devices and sensors to the network to collect and share data. 5G enables greater automation and efficiency in various sectors, such as industry, transport, health and agriculture, and makes the development of innovative new applications and services possible.

The monetisation of 5G is a huge market opportunity for telecoms, technology and entertainment companies.



"The advent of 5G will enable mobile operators to revitalise their digital offerings by leveraging network opportunities. This network innovation will consolidate a hyper-connected society and boost, among other things, the consumption of entertainment, education and sports services".

Cyrille Thivat
CEO OF TELECOMING





5G CONNECTIONS IN EUROPE

A huge deployment for 2027



The 5G network will increase significantly the time spent and data consumed on mobile video platforms, opening new doors for digital streaming providers and taking the viewer experience to the next level with immersive experiences.

G1.- GLOBAL MOBILE 5G ACTIVE CONNECTIONS

| | 2023 | 2027 |
|-------------------|----------|----------|
| 01 UK | 36,6M | 78,2M |
| 02 GERMANY | 26,1M | 74,0M |
| 03 SPAIN | 19,7M | 41,7M |
| 04 FRANCE | 17,7M | 43,2M |
| 05 ITALY | 14,7M | 37,0M |
| 06 POLAND | 11,4M | 34,1M |
| 07 NETHERLANDS | 6,4M | 15,0M |
| 08 SWEDEN | 6,1M | 12,8M |
| 09 SWITZERLAND | 5,4M | 16,9M |
| 10 AUSTRIA | 4,2M | 7,9M |
| 11 BELGIUM | 4,1M | 10,9M |
| 12 CZECH REPUBLIC | 3,2M | 11,3M |
| 13 HUNGARY | 3,1M | 9,3M |
| 14 PORTUGAL | 3,1M | 12,3M |
| 15 FINLAND | 3,1M | 8,3M |
| 16 GREECE | 2,4M | 5,8M |
| 17 NORWAY | 2,0M | 9,2M |
| 18 DENMARK | 1,5M | 6,2M |
| 19 TURKEY | 1,2M | 28,3M |
| 20 IRELAND | 1,1M | 3,0M |
| 21 CROATIA | 1,1M | 3,0M |
| 22 ROMANIA | 0,1M | 7,8M |
| ↘ Total Europe | 174,3M | 476,2M |
| ↘ Global | 1.655,0M | 4.645,9M |

The expected evolution of active 5G connections in some countries between 2023 and 2027 places the UK, Germany and Spain among Europe's TOP leading 5G network countries.

Only some European countries start from the same point, and the year-on-year growth rates between 2023 and 2027 are very different. Thus Romania and Turkey have the highest growth rates, with an average year-on-year growth of 208% and 126% respectively.

Most European countries show growth rates between 30% and 50%, reflecting a solid and steady growth of 5G connections during this period.

More mature countries such as Spain and the UK, among others, show growth rates below 40%. These more moderate rates are due to a more developed 5G network infrastructure and higher consumer adoption of the technology.

G2.- GLOBAL MOBILE 5G ACTIVE CONNECTIONS

| | 2023-2027 (average growth) |
|-------------------|-------------------------------|
| 01 ROMANIA | 208% |
| 02 TURKEY | 126% |
| 03 CZECH REPUBLIC | 74% |
| 04 NORWAY | 65% |
| 05 DENMARK | 61% |
| 06 PORTUGAL | 60% |
| 07 CROATIA | 59% |
| 08 SWITZERLAND | 51% |
| 09 GERMANY | 47% |
| 10 IRELAND | 46% |
| 11 FINLAND | 45% |
| 12 BELGIUM | 45% |
| 13 ITALY | 43% |
| 14 POLAND | 42% |
| 15 FRANCE | 42% |
| 16 GREECE | 41% |
| 17 HUNGARY | 37% |
| 18 UK | 37% |
| 19 SWEDEN | 36% |
| 20 AUSTRIA | 34% |
| 21 NETHERLANDS | 32% |
| 22 SPAIN | 31% |

Europe presents a promising outlook for 5G adoption and expansion. Its year-on-year growth rate will be 48% between 2023 and 2027, indicating significant progress in adopting and expanding 5G connections on the continent. Europe is growing faster than the global average, which stands at 37% year-on-year growth.



The estimated 5G market



G3.- 5G MARKET REVENUE IN 2023

| | | |
|----|----------------|----------|
| 01 | UK | \$9.897M |
| 02 | GERMANY | \$8.167M |
| 03 | SPAIN | \$5.722M |
| 04 | FRANCE | \$5.655M |
| 05 | ITALY | \$3.701M |

G4.- 5G MARKET REVENUE IN 2027

| | | |
|----|----------------|-----------|
| 01 | UK | \$19.485M |
| 02 | GERMANY | \$18.471M |
| 03 | FRANCE | \$11.837M |
| 04 | SPAIN | \$10.244M |
| 05 | ITALY | \$8.082M |

In terms of revenue, the countries that stand out within the 5G market in 2023 will be as follows:

The United Kingdom is on top in terms of 5G deployment ↘

With a turnover of \$9.897M, the UK leads in 2023. The UK 5G market is strong and is generating significant revenues. Great progress is being made in 5G deployment, driven by the UK government's digital connectivity package that will use \$40 million in funding to establish 5G innovation across the UK¹.

Germany gambles 5G ↘

Germany ranks second in turnover with \$8.167M. The German 5G market is also vital. According to Telefónica Germany, 5G technology "has cost €4 billion and is a milestone for the coming years, with which O2 will drive the digitisation of the entire country by 2025" and it will cover it by 2025².

Spain is in the midst of 5G deployment ↘

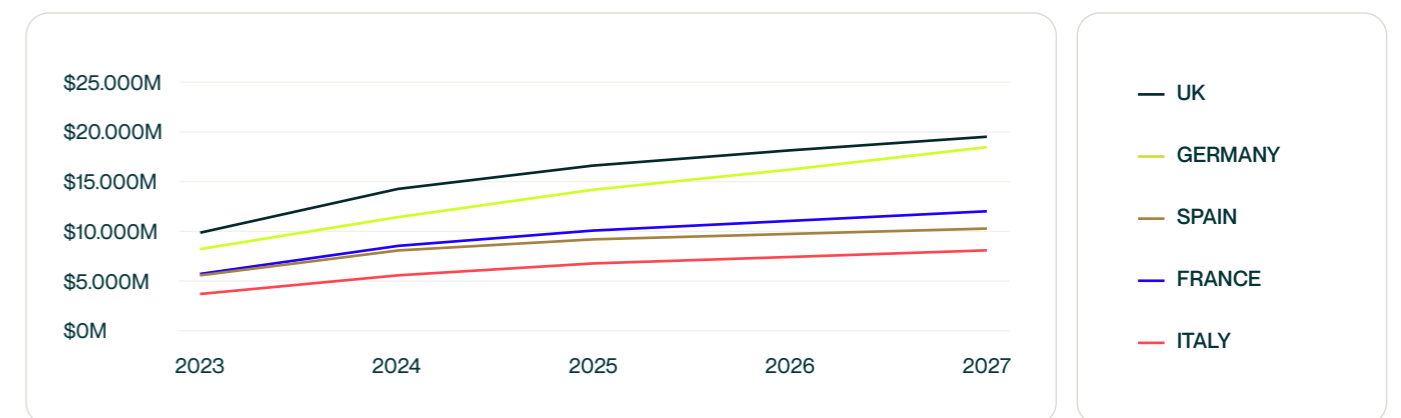
Spain is in third place in terms of turnover, with \$5.722M estimated for 2023.

The European Commission has approved a €680M contribution for Spain to develop 5G infrastructure in rural areas, fostering innovation and competition. This plan will contribute to the digitalization strategy of Spain and the European Union, mainly benefiting areas with less than 10,000 inhabitants.

France keeps developing its 5G infrastructure ↘

France ranks fourth in turnover, with \$5.655M. Although France's size is similar to Spain's, it is slightly behind its neighbour. Since the start of 2023, France's National Frequency Agency (ANFR) has authorised the installation of 38k mobile sites to expand the reach of 5G networks. These initiatives will boost the French market, overtaking Spain in 2027.

G5.- TOTAL GLOBAL 5G OPERATOR BILLED REVENUE



¹ UK will invest €170M in 5G, 6G and satellite Internet

² 5G in Germany, at the cutting edge of technology



BENEFITS FOR EUROPE

5G benefits for Europe



Europe counts as one of the most extensive network deployment infrastructures. Once this infrastructure is definitively implemented, it will generate highly competitive benefits across the continent and will allow Europeans to position themselves among the most advanced players in terms of connectivity and value-added services.



ULTRA-FAST CONNECTIVITY

5G provides significantly faster data speeds than previous networks. This will enable a quicker and smoother internet experience, faster downloads, high-quality video streaming and larger scale online applications and services. Ultra-fast connectivity will boost productivity and efficiency in a variety of areas.



DRIVING TECHNOLOGICAL INNOVATION

5G is a crucial enabler for other emerging technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), Virtual/Augmented Reality (VR/AAR), and autonomous vehicles. By offering faster data speeds and lower latency, 5G makes deploying and developing these technologies more accessible, which can drive innovation in various industries and fuel economic growth.



IMPROVED EFFICIENCY AND AUTOMATION

The low latency and high capacity of 5G facilitate greater efficiency and automation in various fields, such as manufacturing, logistics, energy, and agriculture. With secure and fast connectivity, companies can implement real-time remote control and monitoring systems, optimize their operations and reduce costs.





CONSUMERS AS GREAT AMBASSADORS OF 5G

Users ahead of companies



More than 99% of 5G connections in Spain correspond to consumers. The use by individuals is well above that of companies. This is a global trend. In Europe, in 2023, 98% of 5G network mobile connections came from users.

due to the size of their populations and their respective economies. China will be the top 5G market by 2025, with an expected 600,000 users, while South Korea, Japan and the United States will be the fastest-growing countries in 5G users. Europe as a whole will be behind the four countries mentioned, with a slightly lower share³.

Five global economies will account for over 70% of all global 5G connections by 2025. These are South Korea, Japan, the United States, China and Europe, and their contribution to 5G will be highly uneven,

G6.- TOTAL BILLED REVENUES OF THE GLOBAL 5G OPERATOR

| | 2023 | | 2024 | | 2025 | | 2026 | | 2027 | |
|-------------------|-------------------|-------|-------------------|-------|-------------------|-------|-------------------|-------|-------------------|-------|
| CONSUMER | \$316.550M | 99,8% | \$421.766M | 99,7% | \$502.493M | 99,6% | \$563.235M | 99,4% | \$619.595M | 99,1% |
| ENTERPRISE | \$651M | 0,2% | \$1.283M | 0,3% | \$2.267M | 0,4% | \$3.652M | 0,6% | \$5.633M | 0,9% |
| Global | \$317.201M | | \$423.048M | | \$504.760M | | \$566.887M | | \$625.228M | |



³ The rise of 5G will depend on its use by businesses, not consumers

Incomes. 5G Consumer market.



By 2023, 5G consumer revenues will reach \$316.550M. There will be significant growth in the income of 5G consumers over the years, reaching \$619.595M in 2027.

5G grows as a result of users spending on consumer-oriented services and features that are being developed, such as cloud gaming or extended reality. 5G will bring practical innovations for users, with the right coverage and infrastructure, cloud gaming can deliver high ROI and accelerated growth for 5G providers. Collaboration between cloud gaming providers and 5G operators will result in innovative solutions in the GaaS (Gaming-as-a-Service) space that guarantee users access to their favourite games on any platform or device, at any place or time.

The high speed and responsiveness of 5G are critical to providing immersive virtual and augmented reality experiences. Augmented reality is a technology that combines virtual elements with the real world, providing a complete experience through devices such as smartphones, tablets or special glasses. It allows users to overlay

digital information, such as images, videos or text, in the real world, which creates rich consumption and improves our perception of reality.

Virtual reality is a technology that allows users to immerse themselves in a fully digital world, a computer-generated universe in which they can interact through remotes.

5G provides high-speed download and upload speeds while reducing the time data travels from one point to another (latency). It will enable more detailed and complex virtual reality experiences.

With a 5G connection, extended reality (AR/VR) will be smoother and more responsive, with fuller and more realistic experiences.

G8.- AVERAGE INCOME PER 5G USER



In countries with higher purchasing power, users are often willing to pay more for high-quality services, increasing ARPU. Countries such

as Austria and Denmark generally have a high standard of living, which explains the higher ARPUs.

Incomes. 5G Business market.



In 2023, the revenues of the corporate 5G market will be \$651M.

Like consumer income, there has been a significant revenue increase for 5G companies over the years. These revenue will go to \$5.633M by 2027.

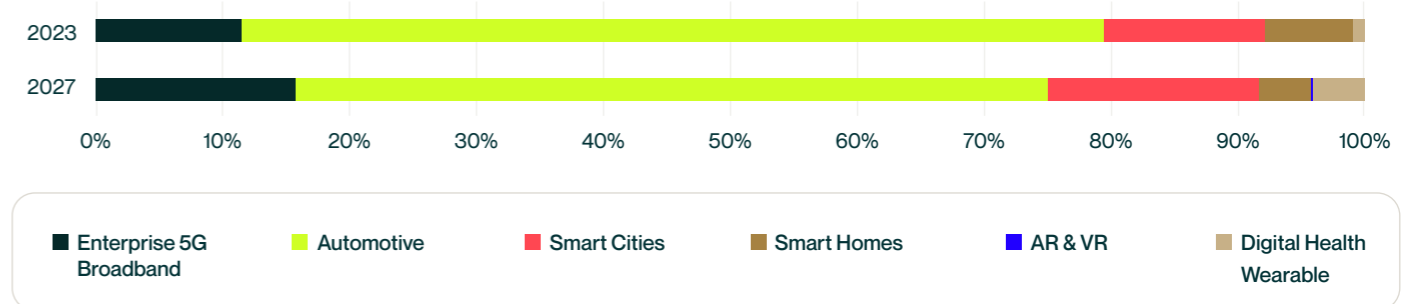
This growth suggests companies' greater interest and adoption of 5G solutions as they leverage advanced connectivity benefits to improve their operations.

Combining 5G with technologies like artificial intelligence and data analytics can drive the transformation of diverse industries. Manufacturing, logistics, energy and agriculture are expected to benefit from improved efficiency, automation, data collection and analysis capabilities.

Currently, at the business level, connected vehicles, smart cities and intelligent homes account for 88% of the market in terms of turnover. Different players will create value services to maximise the network in these sectors.



G9.- TOTAL 5G COMMERCIAL IOT & AUTOMOTIVE OPERATOR BILLED REVENUE, SPLIT BY SECTOR



Broadband sector has a growing role in 5G for businesses revenues. Automotive will remain the dominant revenue sector in 2027 despite the significant growth of 5G solutions in smart cities and their impact on revenues generated.



THE IMPACT OF 5G ON THE WORLD OF SPORT

The telecommunications sector is already operating with new technology companies to develop and commercialise 5G innovations for the sports industry.

On a technical level, 5G networks will offer faster speeds, higher capacity and lower latency than previous generations of wireless technology. On a practical level, these functions will help solve the problem of network congestion in stadiums and allow new use cases that were previously impossible.

These new apps have the potential to enhance the fan experience and unlock new revenue streams for federations, clubs and operators by boosting revenue immediately and adding value to business partnerships.

A more competitive network for sports consumption



IMPROVING THE VIEWER EXPERIENCE

The speed and low latency of 5G will improve the spectator experience in the stadium and at home. The new generation network will eliminate delays and disruptions. It will enable high-quality live video streaming and simultaneous access to additional information, such as real-time statistics and detailed analysis of the match situation. Sports apps will be more personalised, including instant on-demand replays with unlimited viewing and quick and easy sharing.



ADVANCED FORECASTING THROUGH DATA ANALYTICS

Improving athletes' performance and injury prediction will be possible thanks to the 5G network. We will quickly handle large volumes of data to monitor players in real-time during competitions and pre-training.



HIGHER VOLUME OF USER-GENERATED CONTENT

The network enhancement will drive users in the exponential creation and publication of audiovisual content uploaded to the net. User-generated content is a growing trend that until now has had network limitations in massive events due to saturation. 5G will support thousands of users creating content at live sporting events at the same time.



VIRTUAL AND AUGMENTED REALITY

5G will facilitate the adoption of virtual and augmented reality in sports. Spectators could experience significant changes when viewing sporting events on or off the field. In addition, coaches could use augmented reality to analyse tactics and improve athletes' performance.



ESPORTS

The following network generation will transform the eSports industry by offering a smoother gaming experience through reduced latency in online competitions. The 5G network will undoubtedly accelerate the growth of eSports by improving the quality and speed of connections for streamers and fans.



INTERACTIVITY AND EFFICIENCY AT THE STADIUM

With 5G, the stadiums will become genuinely interactive experiences. We will see spectators using their phones to interact with stadium merchandisers; brands can activate their engagement campaigns with real-time contests, voting and games. In addition, the new network will improve stadium security, consolidating digital ticketing, security operations and logistics in real-time.

5G MONETIZATION CHALLENGES

2023-2027 Analysis