



5G TECHNOLOGY

Digital Transformation
of Society



NOVEMBER 2020

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*This is an interactive
file with clickable
VIDEO buttons*



01

What is 5G?

5G technology is the **fifth generation of networks for mobile communications**, but means much more than a substantial increase in the speed with which we communicate or download content from the Internet. Although initially that will be the most appreciated and most demanded functionality (downloading a song will take just a few seconds and a high quality movie will take a few minutes), **5G will bring us a series of features that will allow the development of new applications** that were unthinkable until now with today's mobile communications.



Previous generations of mobile communications:

There are currently 4 generations of mobile communications coexisting (2G, 3G, 4G and 5G), with the fourth generation (4G/LTE) being the most used. The first mobile communication networks were created exclusively to offer voice services. They did not have data transmission capacity (1G). The process of digitalisation of society brought the evolution of these networks to allow data transmission, initially simple and very limited SMS messages, then low-speed data connections (2G).

Data transmission has increased in importance throughout the evolution of mobile communications (3G), to the point where current networks are geared to offering more capacity and speed, with voice taking a back seat (4G).



1G

1980's

Basic analogue voice,
No IP, 0 Kbps ...

One network for voice

NMT, AMPS, TACS



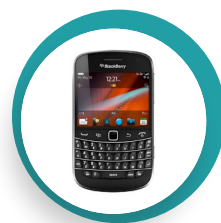
2G

1990's

Digital voice, No IP,
14 Kbps ...

One network for voice

GSM, IS-95,
2.5G (GPRS, EDGE)



3G

2000's

Digital voice, www,
Multimedia, 2 Mbps ...

One network for voice
Other network for IP

UMTS, CDMA2000
3.5G (HSDPA, HSUPA,
HSPA+, LTE)



4G

2010's

Voice over IP,
HD Video, 300 Mbps ...

One network for voice
LTE-Advanced

4.5G (LTE-Advanced Pro)

What makes the 5G generation so special?

—

We are looking at a technology created to meet the needs of the digital society and that **will respond to the demand for mobile data, with an expected increase of 600% over the next five years.**

However, 5G will have a full transformative impact in the industrial and services sectors, becoming a key factor for competitiveness and an unprecedented technological advance.

The 5G mobile communications standard offers key advantages:

- 1**
Speed (up to 10 Gbps, much higher than 4G).
- 2**
Greater capacity to interconnect devices (up to one million per km²).
- 3**
Low latency, application response time (up to 1ms).

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The new 5G communications standard is much more than an evolution of 4G



**5G
2020**

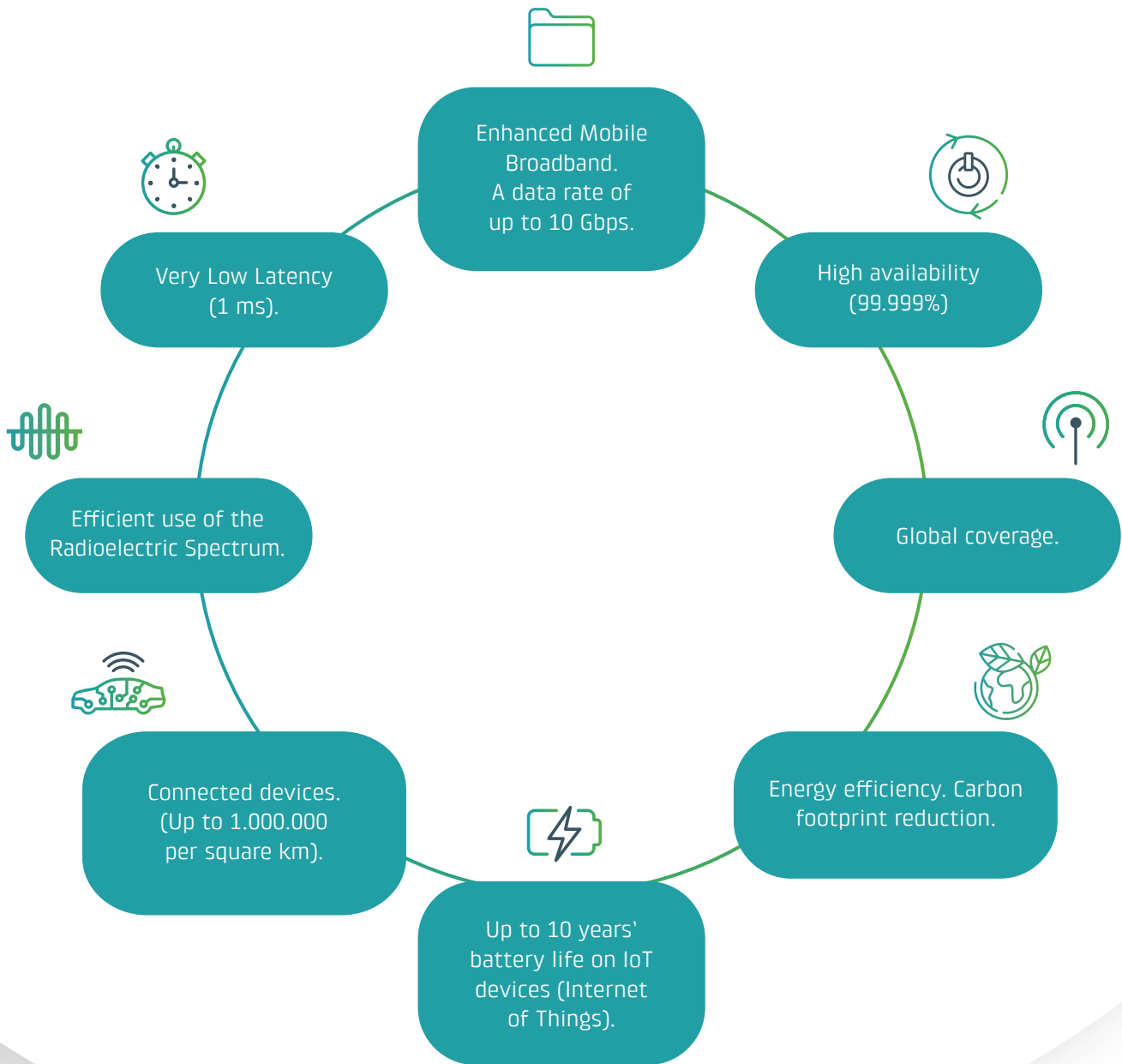
Voice over IP, VR, V2X, IoT, 1Gbps ...

One network for voice

LTE-Advanced Pro, NR

Features

5G technology is characterized by 8 specifications:



The **main functionalities** that **5G technology** will bring can be summarised as:

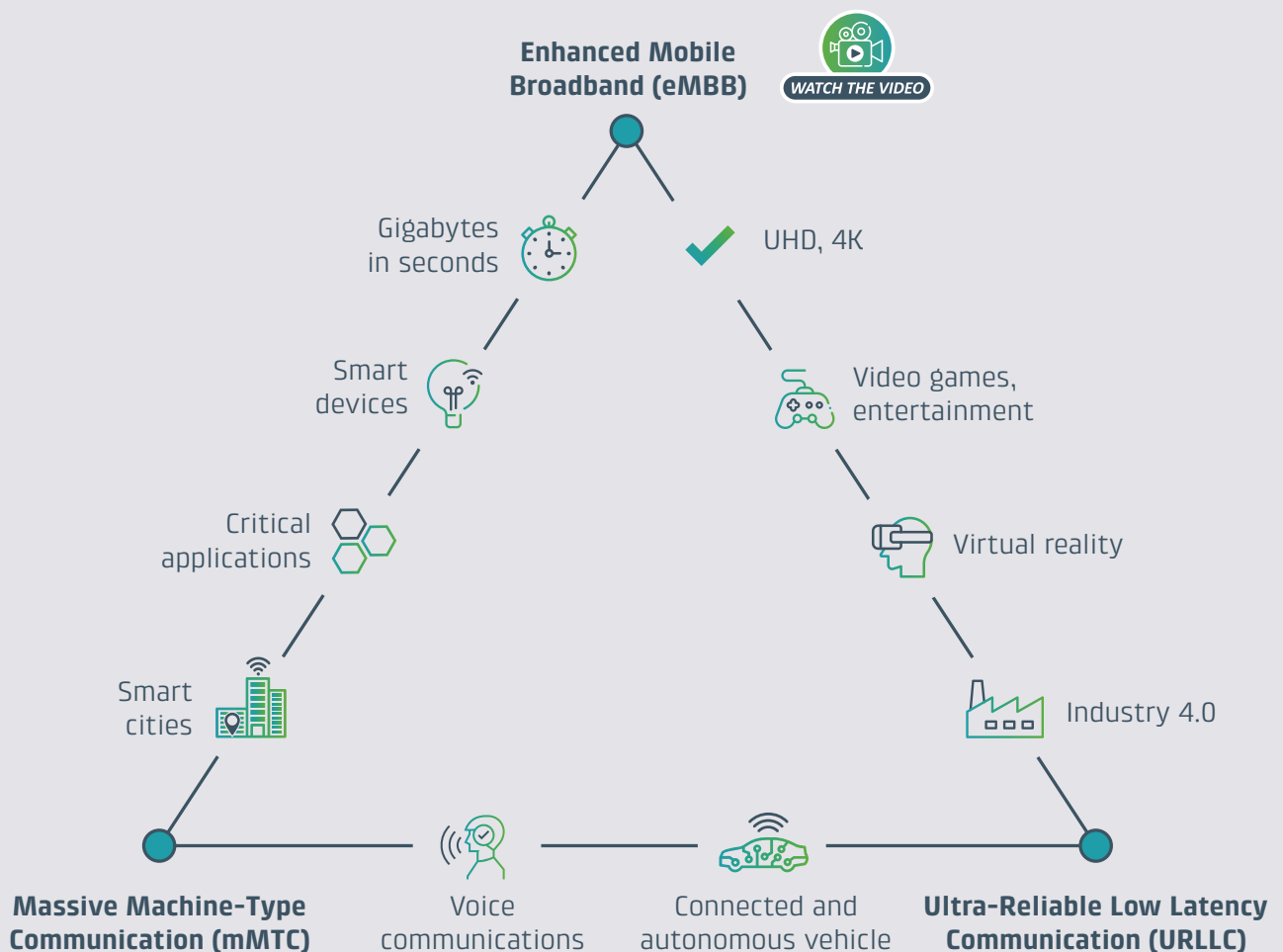
// Enhanced Mobile Broadband

(eMBB). Speeds will reach up to 10 Gbps, allowing ultra-fast content download, very high-quality streaming video or allowing mobile devices to be connected permanently to the network.

// Massive Machine Type Communication

(mMTC). The roll-out of 5G networks will respond to a significant increase in communications between people, but this technology will be decisive in communications between devices (sensors, computers, robots ...) since densities up to 1 million connected devices per square kilometre are expected.

// **Ultra-Reliable Low-Latency Communication** (URLLC). Network latency, or the time required to respond to a petition, will be very low, aiming to reach 1ms latency rates. Additionally, communications will have a high guarantee of availability.





Toolbox, techniques and concepts

The development of the fifth generation of mobile communications rests on a wide range of concepts and technical solutions. Some already existed before and 5G has spurred their development, while others are totally new.



Beamforming

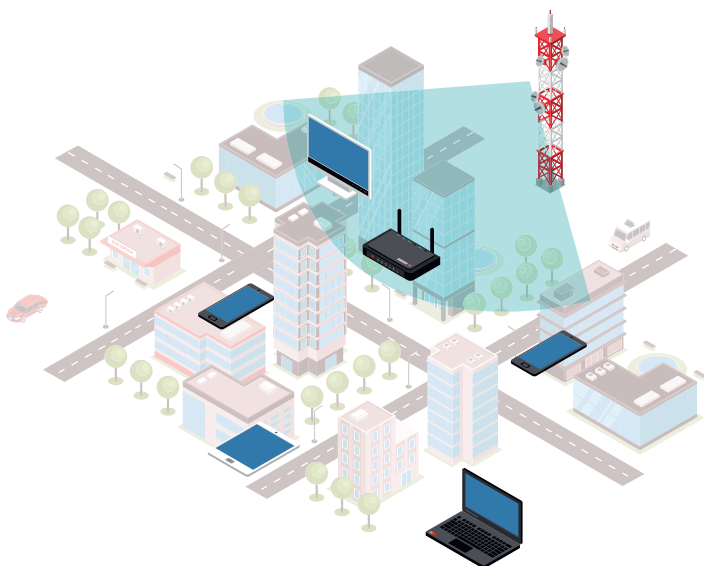
This technique makes it possible to illuminate the areas where the users are. As an analogy, the current system would be like switching on a light bulb (the light arrives equally everywhere) while beamforming would be like turning on a flashlight and focusing directly where it is needed.

The system is dynamic and can adapt to variations in demand for services during the day (high demand in commercial and industrial areas, on public transport) and at night (demand shifts towards residential areas), the variation in propagation (for example, the signal is attenuated to a greater extent in the presence of rain) or seasonal increases in demand (for example, due to the influx of users in coastal areas in the summer). This technique also allows the beam to follow users as they move around (for example, a vehicle or a train), which is an important step forward in the concept of mobility and efficiency.

“

Allows the beam to follow the user as they move around, improving mobility and efficiency.

4G. Antenna sector



5G. Beamforming



MEC

Edge Computing

This is undoubtedly one of the most beneficial technological developments for 5G, and is enabling the development of new applications that were not possible until now. The idea is quite simple and is based on the principle of having resources (storage, databases, information processing) close to the people who will need them (the data does not have to travel to a distant server, but is processed near the user). This achieves three benefits:

Reducing latency, the time the system takes to respond to a user request.

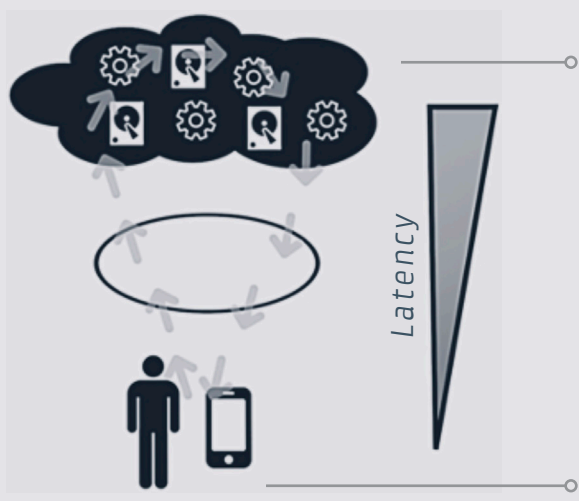
Offloading unnecessary traffic from main networks. **Avoiding information losses** or service difficulties in the event that the main networks become saturated.

Applications such as autonomous vehicles, real-time multiplayer games and the digitalisation of industry with elements such as robotics and artificial intelligence will undoubtedly benefit from this new technological concept.

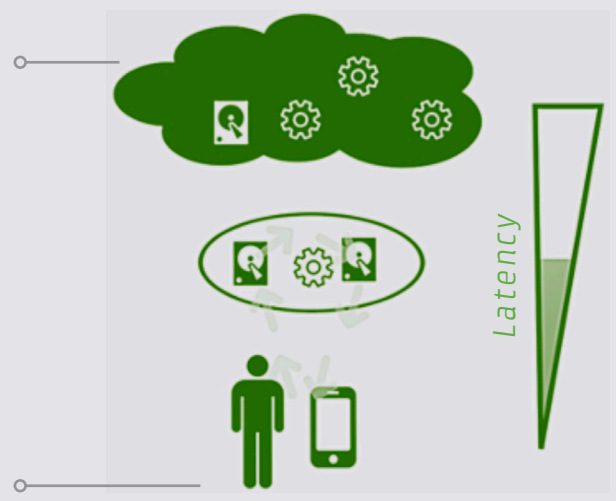


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CENTRALISED RESOURCES (Without Edge Computing)



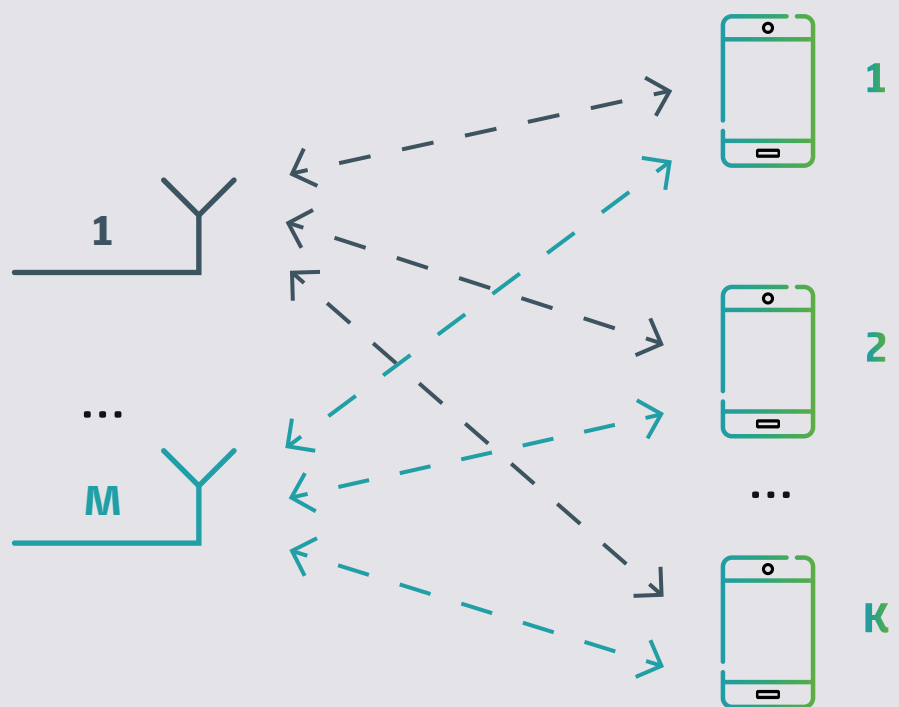
EDGE COMPUTING



MIMO (múltiple input, múltiple output)

Multi-antenna systems have long been used in wireless communications and **render such communications more efficient, especially in environments with many obstacles.**

The principle is simple: as it travels, the signal rebounds and is subject to multiple attenuations, which sometimes makes it impossible for it to be received under minimum quality conditions to maintain communication. Incorporating many transmitting antennas provides multiple signal paths, making it easier for the signal to maintain its quality along any of these paths. Similarly, incorporating multiple antennas at the receiving end means that the signal will also be received with sufficient quality.



Energy efficiency

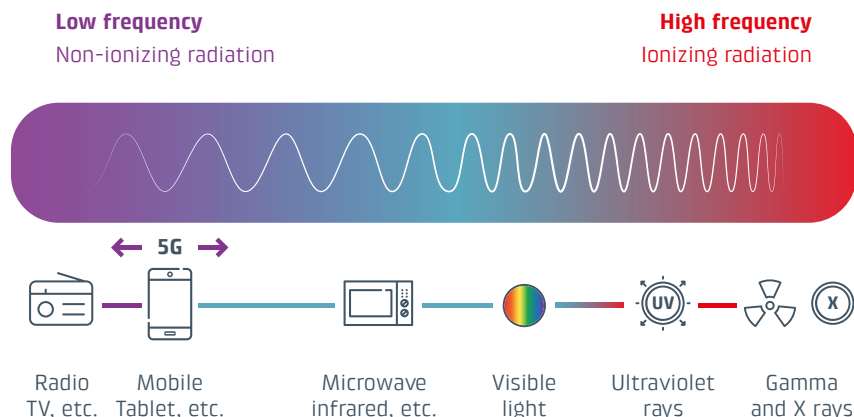
5G technology requires dense networks comprising numerous antennas and other components, which forces the development of high energy efficiency solutions, reducing the impact of mobile communications on the carbon footprint and global warming, while they are also economically viable.

The aim is to reduce the electrical consumption of the equipment by 10%.

Frequencies

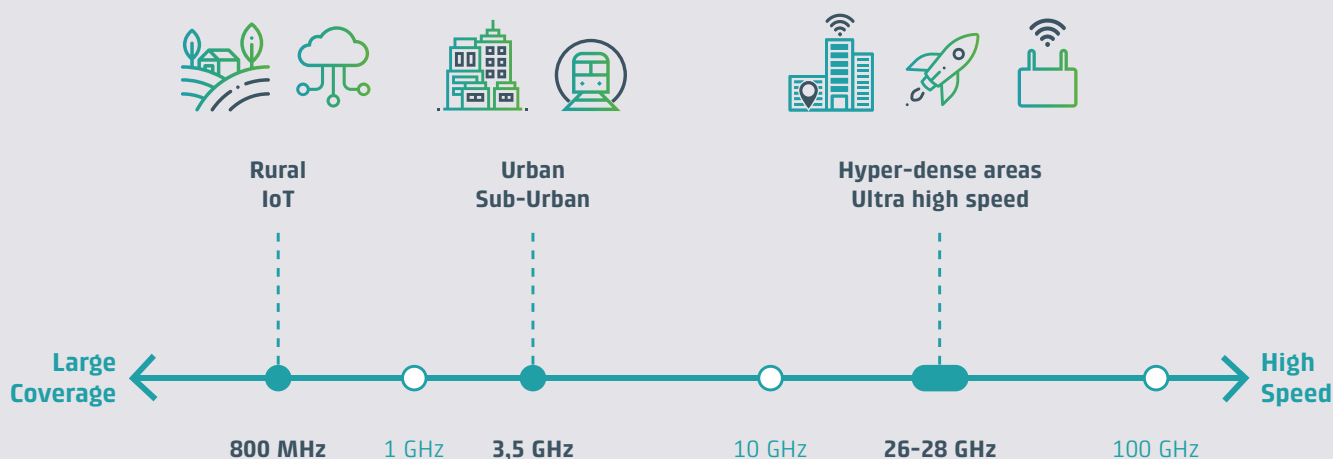
Frequency is the medium through which the information is transmitted. We

cannot say that some frequencies are better than others, only that each frequency band is more suitable for some or other applications.



Generally speaking, **frequencies below 1 GHz** (including, for example, those used in the first generations of mobile telephony and those used today for digital television) **are easily propagated since they are scarcely attenuated by obstacles**, making it possible to serve very large areas with relatively few stations. However, the volume of data they can transmit is limited.

The frequencies above 6 GHz have a very high capacity to carry data and have never been used for commercial mobile telephony before the arrival of 5G. These frequencies enjoy of a high data-transmission capacity and will allow 5G to reach maximum transmission speeds. However, propagation is greatly affected by obstacles, therefore their range does not usually exceed 200-300 metres. A good balance is achieved between coverage and capacity in the 1 GHz to 6 GHz band, which is why these frequencies are generally used today.



Next Generation Central Office (NGCo)

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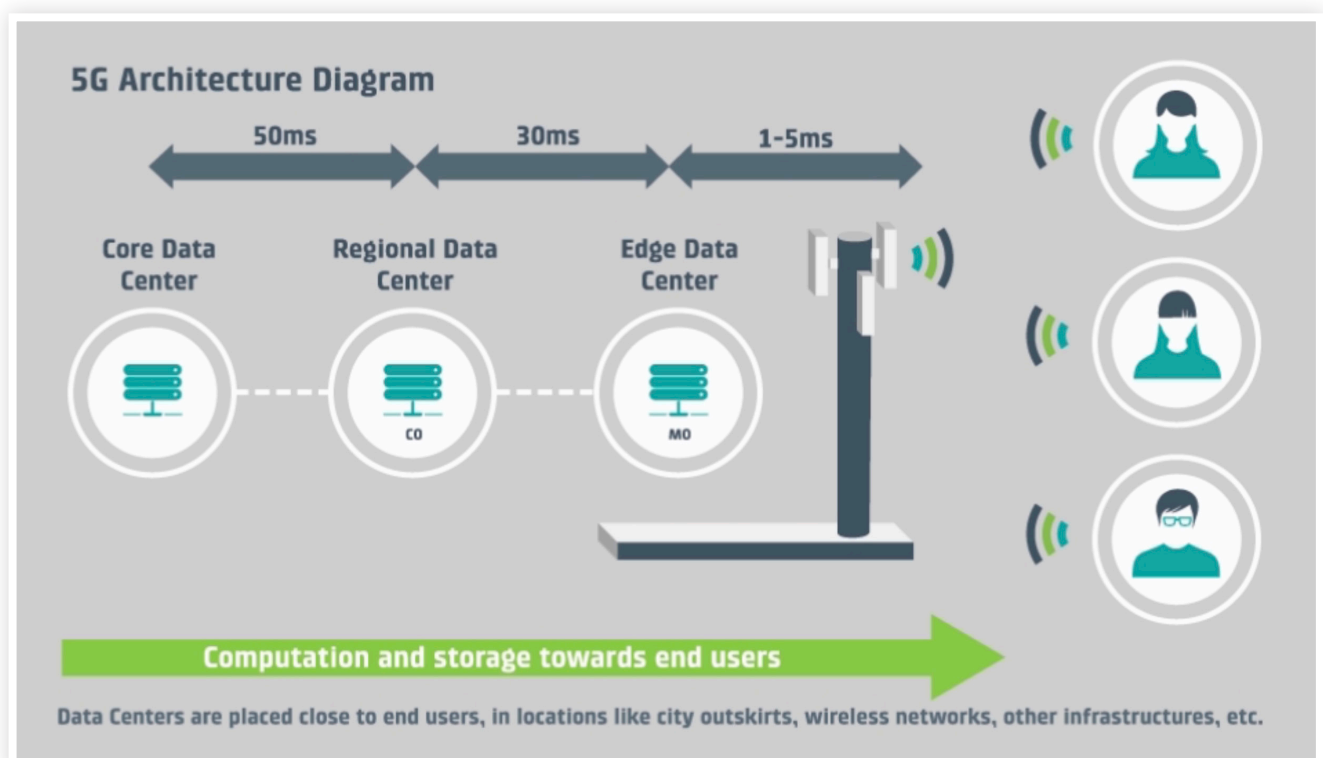
Purpose: to reduce the cost of equipment and increase reliability.

This important concept covers one of the keys to the new features of 5G. The roll-out and commissioning of previous generations of mobile communications (and by extension other technologies such as DTT or emergency networks) was achieved using specific equipment dedicated exclusively to these networks. Such equipment is very efficient for the technology for which it is designed, but lacks the flexibility and necessary scalability to adapt to different operating environments or to technological developments. In recent years, with the arrival of increasingly powerful computers and servers and the generalised use of cloud processing, it is increasingly common for systems intelligence to be supported by software (much easier to evolve, adapt or change), which works on general-purpose hardware (computers, servers).

The advantages are twofold: on one hand, using general-purpose computers or servers **significantly reduces the cost of equipment and increases reliability**; on the other hand, the software that runs on these computers is very **easy to adapt to the final application or to change to another with new features**.



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General-purpose servers are installed in infrastructures that provide fibre optic connectivity, backup power using batteries and/or diesel generators and physical security to prevent unauthorized access.

These infrastructures are known as data processing centers or more commonly datacenters. The classic datacenter is a large warehouse lined with hundreds or thousands of cabinets containing computer equipment. Today, the datacenter concept has evolved towards a decentralised architecture, with many more data processing centres, but smaller in size.

The advantages offered by these distributed systems are:

// Latency, as they are located closer to the end users.

// Compliance with data protection laws, which may be different in different countries or regions.

// Improved availability and reliability of the overall system, since it is a distributed system.

// Best final price fit, more in line with the local costs of the infrastructure.

// Offloading traffic from backbone networks, as the volume of information travelling to remote processing centres is reduced. The architecture of distributed datacenters defines several levels and sizes of these:

[1] CORE datacenter

Large centralised infrastructures, typically of more than 1,000 m² and with an energy power generally exceeding 1,000 kWatts.

[2] REGIONAL datacenter

Also known as Central Offices (CO). Medium-sized datacenters (between 100 m² and 1,000 m²) that provide services to urban areas or industrial estates. They allow data processing that is both more efficient and has less lag.

[3] EDGE datacenter

Also known as Metropolitan Offices (MO). A small area with a few racks located very close to the end user, typically in the same location as the 5G equipment is located, or very close to it. This type of datacenter makes it possible to drastically reduce network response time and will be key to achieving latencies as low as 1 ms.

Optical Fibre

A few simple mathematical operations will show that **the high transmission speeds that 5G technology will allow us will generate a huge volume of data traffic** between base stations and Internet networks. **This traffic will need to be routed through optical fibre**, the only technology able to manage these large volumes of data.

It makes no sense for a user to have a very high-speed mobile terminal if there is a bottleneck between the base station and the Internet. In this connection, it is essential for optical fibre to reach every single site from which 5G will be transmitted, a concept known as Fibre-to-the-Tower (FTTT). By extension, given that 5G transmissions will require the use of supports other than towers (street lamps, urban furniture, etc.), some more general concepts are used, such as Fibre-to-the-Antenna (FTTA) or Fibre-to-the-Small-Cell (FTTSC).

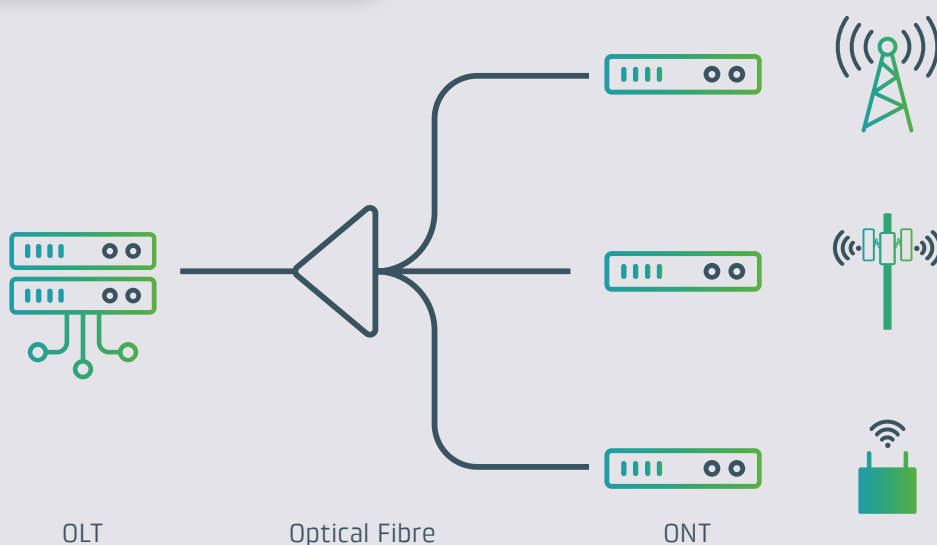


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The high volume of data is routed through optical fibre.

FIBRE TO EVERYTHING



Densification

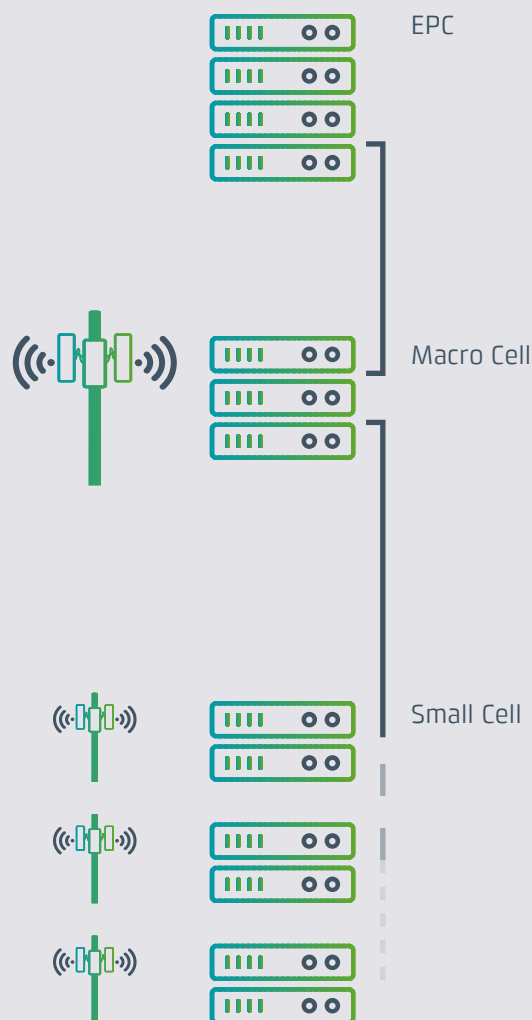
The mobile phone holds a central role in the process of digitally transforming society, since it has displaced other physical elements for entertainment or information and has incorporated data connection features, giving prominence to audiovisual content over voice.

The need for permanent connectivity requires operators to roll out new networks comprising micro-antennas that blend in with the surroundings to meet the demand for coverage, especially in high footfall areas such as shopping centres, sports stadiums or public transport. Network capacity is expanded by dividing the coverage into much smaller areas, with a very low-power antenna in each one. Each antenna provides service to very few users, which means they can have a very high data rate (there are fewer users to share it with), and a very low power (equivalent to speaking quietly) while minimising interference with other nearby areas.

Antenna densification allows to serve several operators simultaneously without having to increase the number of antennas to be installed by a factor of 3 or 4, reducing required total investment, visual and environmental impact and allowing faster 5G roll-out.



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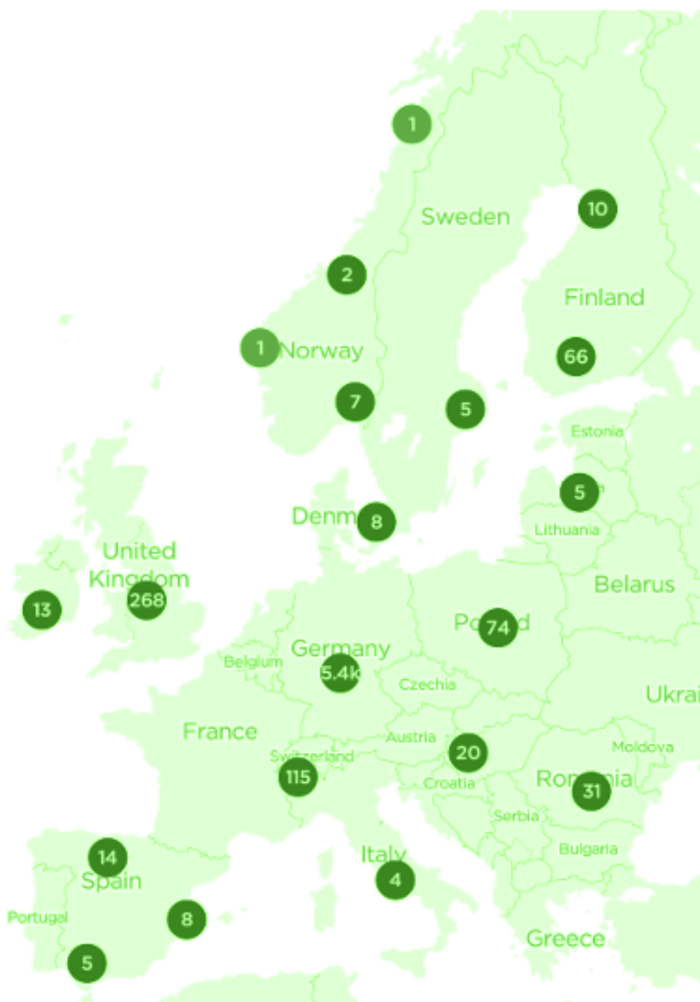
When will we have 5G?



Map of 5G roll-outs

The first commercial 5G services were launched at the end of 2019 and could be received by the over thirty models of mobile terminals compatible with 5G currently available on the market.

In October 2020, the official website of the GSMA (association of companies related to mobile communications) lists more than 6,700 roll-outs (areas served by an operator) of 5G in Europe and more than 15,000 worldwide.



The global map of 5G roll-outs is updated weekly and is endorsed by the GSMA.

 [VISIT UPDATES](#)

Accessible directly via this button.

 [DIRECT ACCESS](#)

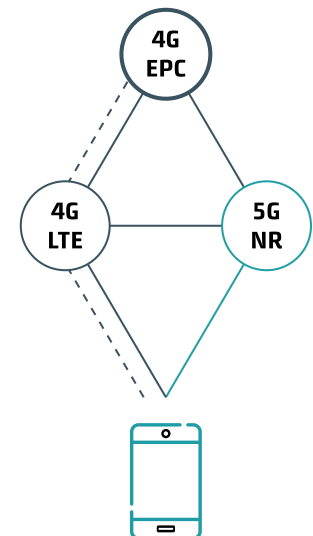
Transition from 4G to 5G: Non-Standalone vs Standalone

International companies and organisations are working non-stop to improve technologies, which in mobile communications are replaced approximately every 10 years. During that time, a transition occurs between the current technology and the next, i.e., between 4G and 5G.

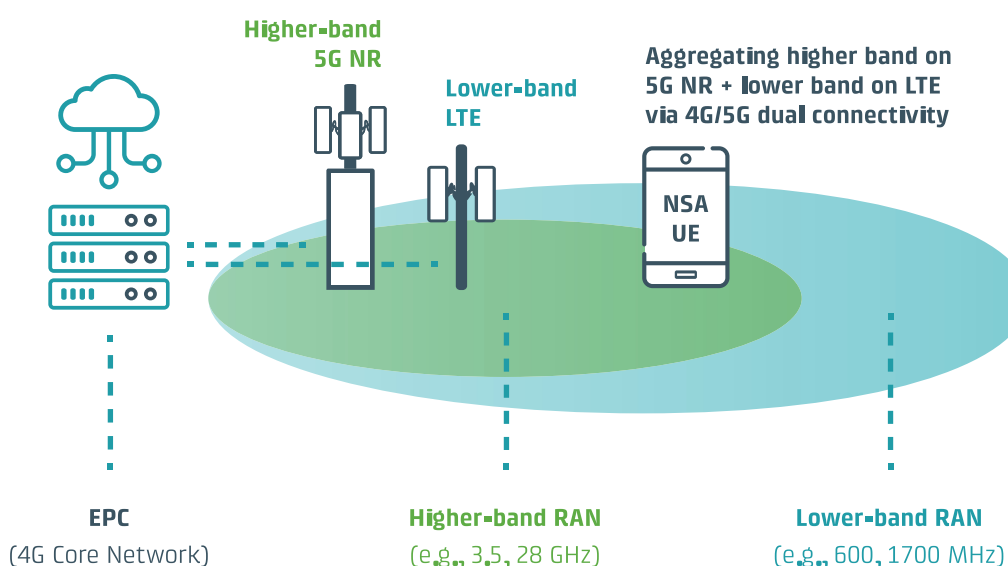
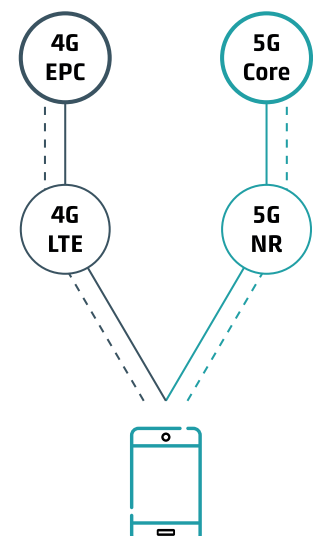
Currently work is under way on a gradual and progressive transition to new technology, for which **new “5G” services are being offered, such as high-speed internet access**, supported on current 4G enhanced networks. This phase is known as **“5G Non-Standalone”**

In the near future, operators will roll out exclusive networks with 5G technology in the process called **“5G Standalone”**. **These networks will offer all the advantages associated with 5G** such as low latency, connectivity of millions of devices or transmission speed.

5G NON-STANDALONE Only some 5G features available



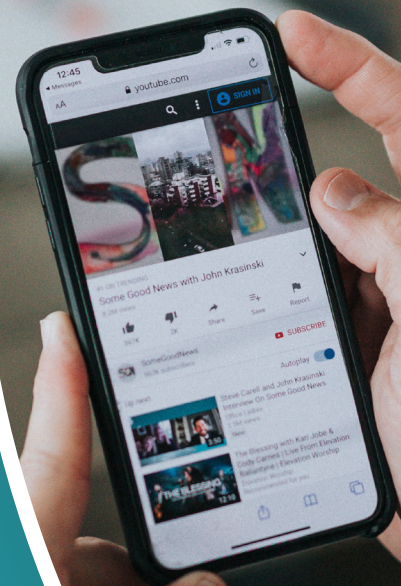
5G STANDALONE All 5G features available



04

What will 5G be used for?

The 5G standard contributes directly to the digital transformation of society and industry. They two realities are indivisible, since **5G is linked to new services that society demands and to new production models.**



Services and applications for the citizen

Densification of communications networks with 5G in the city, with micro antennas located in urban furniture, **offers citizens the possibility to access content, applications and value-added services** with minimal latency. The arrival of 5G will herald a significant improvement in applications related to consumption of goods and services, leisure, tourism and relations with the various levels of administration.



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Bridging the digital divide

5G will make it possible to expand high-speed broadband coverage in rural and isolated areas, helping to revitalise the agricultural sector and local industry and making applications and services available to the general population.

Goods transport and tracking

The application of 5G to the logistics sector will allow companies to **geolocate and monitor all their assets in real time in a warehouse or factory**, as well as during shipment or along different routes, fostering online commerce and improving the experience of logistics operators as well as the end customer.



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SEE THE WEBINAR (45')

The Next-Generation of Mobile Networks



WATCH THE VIDEO



Boosting industry

With 5G technology we will see the roll-out of private communications networks dedicated specifically to each segment or activity. **Industries will benefit from secure and guaranteed communications and will improve their performance**, by adding elements such as artificial intelligence and the development of robotic processes to these communications.



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Applications aimed at security

The minimum latency (response time) that 5G allows **is decisive for the development of security-related services**. The capacity of the network will serve to detect fires hundreds of kilometres away and monitor them at all times, with the help of drones equipped with thermal imaging cameras and very accurate geolocation systems.

With the application of artificial intelligence, we will be able to foresee any type of incident, anticipate it and resolve it before it even occurs.

The mobility of the future will be 5G

Current mobility is strongly linked to sustainability and environmental conservation. In this area, the advantages offered by 5G communications are crucial. The vehicle permanently connected to the road, traffic lights, other vehicles, etc. leads to safer and more efficient mobility. This will be possible – among other things – thanks to the low latency guaranteed by 5G, reducing to practically zero the response time to events like a possible collision. The development of self-sustaining communications networks in the road system is key to the development of mobility.



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Prevention and monitoring using drones with precise thermographic cameras.

50

5G pilots and PoC developed by Cellnex

5G technology is responding to new social and industrial challenges. The development and commissioning of pilots and proofs of concept makes it possible to validate solutions in real environments.





Lean. 5G Rural

Developing broadband solutions for areas with low economic returns, such as rural areas and developing countries. The pilot is conducted in the town of Matanza de Soria, district of San Esteban de Gormaz, with just 20 inhabitants and aims to digitalise a wine company.



Rural connectivity	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Frequencies
Entertainment	<input type="checkbox"/>	<input type="checkbox"/>	Energy efficiency
Broadcasting	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Edge Computing
Security and emergencies	<input type="checkbox"/>	<input type="checkbox"/>	Beamforming
Connected devices	<input checked="" type="checkbox"/>	<input type="checkbox"/>	MIMO
Private networks	<input type="checkbox"/>	<input type="checkbox"/>	Low latency

Fixed Wireless Internet

Developing rural mobile broadband using beamforming as an alternative to a conventional optical fibre roll-out, which would not be economically viable. High towers are used where antennas are installed to allow the signal to be focused on sites lacking coverage, at a great distance and optimising the necessary energy.



Rural connectivity	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Frequencies
Entertainment	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Energy efficiency
Broadcasting	<input type="checkbox"/>	<input type="checkbox"/>	Edge Computing
Security and emergencies	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Beamforming
Connected devices	<input type="checkbox"/>	<input type="checkbox"/>	MIMO
Private	<input type="checkbox"/>	<input type="checkbox"/>	Low latency



Agriculture 4.0



The HD camera captures images of the fruit and sends them to the Edge Computing node. The artificial intelligence system determines whether the fruit is optimally ripe for harvesting by the robotic arm. The 5G network enables low latency communications and wireless control of the robot.

Rural connectivity	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Frequencies
Entertainment	<input type="checkbox"/>	<input type="checkbox"/>	Energy efficiency
Broadcasting	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Edge Computing
Security and emergencies	<input type="checkbox"/>	<input type="checkbox"/>	Beamforming
Connected devices	<input checked="" type="checkbox"/>	<input type="checkbox"/>	MIMO
Private	<input type="checkbox"/>	<input type="checkbox"/>	Low latency

5G Energy Efficiency

Prototype of a shelter for a rural location with new technologies for energy optimisation and applied to cooling systems. New materials and new mechanisms, as based on Phase Change Systems (PCR). Edge Computing nodes complement the energy optimisation analysis.

Rural connectivity	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Frequencies
Entertainment	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Energy efficiency
Broadcasting	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Edge Computing
Security and emergencies	<input type="checkbox"/>	<input type="checkbox"/>	Beamforming
Connected devices	<input checked="" type="checkbox"/>	<input type="checkbox"/>	MIMO
Private networks	<input type="checkbox"/>	<input type="checkbox"/>	Low latency





Crowd Management

Automatic guidance system to optimise traffic management in the Port of Algeciras during *Operación Paso del Estrecho*, based on real-time licence plate recognition and guidance with light panels. The information collected by the cameras is processed locally and in real time on the Edge Computing node.

Rural connectivity	<input type="radio"/>	<input type="radio"/>	Frequencies
Entertainment	<input type="radio"/>	<input type="radio"/>	Energy efficiency
Broadcasting	<input type="radio"/>	<input checked="" type="radio"/>	Edge Computing
Security and emergencies	<input checked="" type="radio"/>	<input type="radio"/>	Beamforming
Connected devices	<input checked="" type="radio"/>	<input type="radio"/>	MIMO
Private networks	<input type="radio"/>	<input checked="" type="radio"/>	Low latency

5G Firefighter

The images captured by the high-resolution camera and thermal camera installed on the drone are processed locally (edge computing) to obtain a video with georeferenced images on a map of the area. The result is sent through the private broadband network to be distributed to the security forces, achieving optimal control of the fire containment perimeter.

Rural connectivity	<input type="radio"/>	<input checked="" type="radio"/>	Frequencies
Entertainment	<input type="radio"/>	<input type="radio"/>	Energy efficiency
Broadcasting	<input type="radio"/>	<input checked="" type="radio"/>	Edge Computing
Security and emergencies	<input checked="" type="radio"/>	<input type="radio"/>	Beamforming
Connected devices	<input type="radio"/>	<input type="radio"/>	MIMO
Private networks	<input checked="" type="radio"/>	<input checked="" type="radio"/>	Low latency



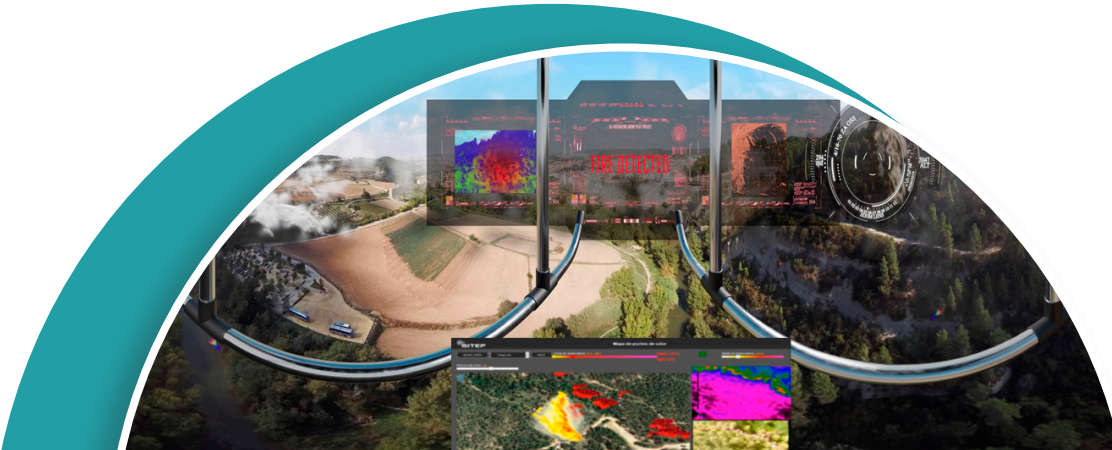
CELLNEX TRENDS



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Veo5G. Network Virtualization

Design and implementation of a virtualised 5G network, with multi-operator capabilities, using general purpose equipment and specific software to develop 5G functionalities. The proposed use case corresponds to the remote control of a device that requires very low latency (drone, autonomous vehicle, industrial robot) and simultaneously sends high-quality video that requires a large bandwidth.



Rural connectivity	<input type="radio"/>	<input checked="" type="radio"/>	Frequencies
Entertainment	<input type="radio"/>	<input type="radio"/>	Energy efficiency
Broadcasting	<input checked="" type="radio"/>	<input checked="" type="radio"/>	Edge Computing
Security and emergencies	<input type="radio"/>	<input type="radio"/>	Beamforming
Connected devices	<input checked="" type="radio"/>	<input type="radio"/>	MIMO
Private networks	<input type="radio"/>	<input checked="" type="radio"/>	Low latency

5G City. Neutral host for cities

A project developed by a European consortium of 18 companies to develop 5G technology to respond to the real needs of cities. The pilots and proofs of concept are carried out in the cities of Barcelona, Lucca and Bristol, and include use cases such as prevention of unauthorised waste dumping, video production and distribution at live events and cooperative, connected and autonomous mobility.



Rural connectivity	<input type="radio"/>	<input type="radio"/>	Frequencies
Entertainment	<input type="radio"/>	<input type="radio"/>	Energy efficiency
Broadcasting	<input checked="" type="radio"/>	<input checked="" type="radio"/>	Edge Computing
Security and emergencies	<input checked="" type="radio"/>	<input type="radio"/>	Beamforming
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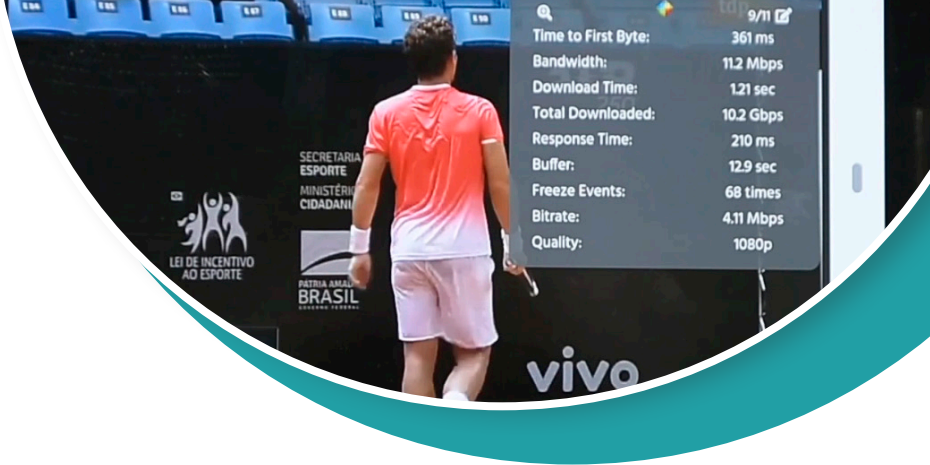


5G Adaptive

The system makes it possible to confirm the improvement in user experience when consuming media content from a local server (4K quality) rather than from a remote server (standard quality). The system also identifies the presence of new users to dynamically adapt available resources to optimise the quality of the video. The entire network benefits from local content download, optimising the available resources.



WATCH THE VIDEO



Rural connectivity



Frequencies

Entertainment



Energy efficiency

Broadcasting



Edge Computing

Security and emergencies



Beamforming

Connected devices



MIMO

Private networks



Low latency

5G Cruïlla Festival

A new way to attend and participate in a musical event. The system facilitates real-time 360° video streaming, which can be viewed with virtual reality glasses, which place the viewer on the same stage as the musicians. A new way to attend musical events.



CELLNEX TRENDS



WATCH THE VIDEO

Rural connectivity



Frequencies

Entertainment



Energy efficiency

Broadcasting



Edge Computing

Security and emergencies



Beamforming

Connected devices



MIMO

Private networks



Low latency



5G VR for education

The combination of a 5G access technology, with Edge Computing and Augmented Reality, make it possible to offer educational solutions used by IESE business school to connect teachers and students. The combination of real and virtual image in augmented reality is possible in real time thanks to processing in a nearby node (Edge Computing) and is accessible in real time and with high bandwidth within a 5G private network.



Rural connectivity	<input type="radio"/>	<input type="radio"/>	Frequencies
Entertainment	<input checked="" type="radio"/>	<input type="radio"/>	Energy efficiency
Broadcasting	<input checked="" type="radio"/>	<input checked="" type="radio"/>	Edge Computing
Security and emergencies	<input type="radio"/>	<input type="radio"/>	Beamforming
Connected devices	<input checked="" type="radio"/>	<input type="radio"/>	MIMO
Private networks	<input type="radio"/>	<input checked="" type="radio"/>	Low latency

5G Live Event Production

Using the 5G network to broadcast the HD audiovisual signals of a live event in the city of Barcelona, with remote performance from the XAL/ BTV production studios and public contributions from mobile devices.



Rural connectivity	<input type="radio"/>	<input type="radio"/>	Frequencies
Entertainment	<input checked="" type="radio"/>	<input type="radio"/>	Energy efficiency
Broadcasting	<input checked="" type="radio"/>	<input checked="" type="radio"/>	Edge Computing
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Connected devices	<input type="radio"/>	<input type="radio"/>	MIMO
Private networks	<input type="radio"/>	<input checked="" type="radio"/>	Low latency





Virtual Personal Shopper

Immersive shopping experience through real-time communication between the figure of the personal shopper and the end customer. The pilot takes place in the Boqueria Market (Barcelona) and allows remote users to live the shopping experience in real time thanks to the devices carried by the personal shopper.

Rural connectivity	<input type="radio"/>	<input type="radio"/>	Frequencies
Entertainment	<input type="radio"/>	<input type="radio"/>	Energy efficiency
Broadcasting	<input type="radio"/>	<input checked="" type="radio"/>	Edge Computing
Security and emergencies	<input type="radio"/>	<input type="radio"/>	Beamforming
Connected devices	<input checked="" type="radio"/>	<input type="radio"/>	MIMO
Private networks	<input type="radio"/>	<input checked="" type="radio"/>	Low latency

Holographic Telepresence

Telepresence using holographic, bidirectional and real-time techniques. The low latency capabilities of 5G supported by local processing of information allow people to interact in real time both locally and remotely without any lag.

Rural connectivity	<input type="radio"/>	<input type="radio"/>	Frequencies
Entertainment	<input type="radio"/>	<input type="radio"/>	Energy efficiency
Broadcasting	<input type="radio"/>	<input checked="" type="radio"/>	Edge Computing
Security and emergencies	<input type="radio"/>	<input type="radio"/>	Beamforming
Connected devices	<input checked="" type="radio"/>	<input type="radio"/>	MIMO
Private networks	<input type="radio"/>	<input checked="" type="radio"/>	Low latency







5G MED

Remote Driving

Road infrastructure digitalization

Future Railway Mobile Communications

Follow-ME Infotainment



Myths and Reality

It is important to clear up some doubts about the implementation of this new technology that will affect all sectors of our society.



When will 5G technology be available?

—

5G technology is already a reality in many European and world cities. **Check the availability of services' details on page 18, "Map of 5G roll-outs".**

Does 5G pose a health risk?

—

After more than 50 years of research on the possible health effects of the radio signals used for mobile phones — including the frequencies planned for 5G — **no scientific evidence has been found to suggest that there is any health risk associated with the electromagnetic radiation used by 5G.**

Numerous studies have examined whether mobile phones can increase the risk of cancer, and so far no link has been confirmed scientifically between these two factors. As an example, between 1990 and 2016, the number of mobile phone users in the UK increased by 500%, while the number of diagnosed brain tumours increased by 34%; an increase attributed to improved diagnostic techniques and the greater life expectancy of the population.

Does 5G consume more data?

—

5G responds to the growing demand for data and transmission speed. 5G technology improves the transmission of information, in other words, **more tasks can be performed and more data consumed in less time**, therefore the cost of data is expected to decrease over time, but will ultimately depend on the operators.

Are there no 5G-compatible terminals on the market?

—

At the time of writing, **there are more than 50 models of 5G-compatible terminals on the market**, both high-end and mid-range. Likewise, the main manufacturers of chipsets and modems for mobile terminals (Qualcomm, MediaTek, Samsung, Huawei) are betting on the development of 5G. It should be borne in mind that not all terminals support all the planned frequency bands for 5G or all the features of the standard.

Are there two types of 5G, one faster than the other?

—

5G networks are being rolled out gradually, adding new functionalities and improvements. **See Section 3 for details.**



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5G TECHNOLOGY

Disclaimer

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